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ABSTRACT

This newsletter examines education technology issues of concern to school faculty and administrators. Regular features in each issue include educational technology news, a book review, and a question and answer column. The cover articles during this volume year are: "The Decision-Making Process: as Important as the Decision"; "Faculty Uses of Computers: Fears, Facts, and Perceptions" (John Hirschbuhl); "The 7 Characteristics of Highly Effective IT Services"; "More Great Myths of Computing"; "What to Look for in a CIO"; "Hot Issues 1994-95"; "The Campus AIS: Keep or Replace?"; "Campus Telecommunications: Easing Faculty Fears" (John W. Bardo); "Renting Expertise: A Small College's Solution" (Lawrence W. Mazzeno); "The Library of the Future: A Hybrid Model" (David Cossey); "Emulating Mickey Mouse Without Feeling Goofy" (Howard Strauss); and "A Question for the CEO: Campus of the Future or Future of the Campus?" (William H. Graves). (MAS)

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THE
April 1994
Volume 10
Number 1

EDUTECH REPORT

The Education Technology Newsletter for Faculty and Administrators

ED 387 128

The Decision-Making Process: as Important as the Decision

There's no doubt about it; information technology is risky business. With things changing so quickly, and with the overabundance of information from all different directions, it's easy enough to make a mistake, to make the wrong decision about a direction, a product, a vendor, even an entire technology. Should we invest in an open system or a high-quality, well-accepted proprietary system? Should we go with Windows NT or Unix? Should we use the twisted pair wiring we already have or replace it with coax? Do we stay with MVS or downsize to a client/server environment? Each of these decisions will require some investment of money, time, and energy to implement, and most colleges and universities can hardly afford to have those investments wasted on the wrong decision.

And as bad as it is for information technology professionals, it's even worse for the upper-level decision makers at the institution; they typically have fewer tools with which to be able to sort out the various issues and conflicting information. They may be faced with making information technology decisions in an environment where the views of the computer center differ from those of the computer science faculty, or the registrar disagrees with the admissions director. It too often becomes a game of Who Do You Trust?

Is there a way to prevent bad decisions? Yes, there is a decision-making process which, if followed faithfully, will yield good decisions in every circumstance. Will all of these decisions be right as well as good? Not necessarily, but that's just the nature of information technology at the moment. It is, unfortunately, unrealistic to think that information technology decisions will be right all the time. What we do have, however, is a way to ensure that every decision made is a good one, and even the best one possible. The decision may not be

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"The nature of teaching will change by attrition. When the old dogs who won't learn new tricks go to doggie heaven, they will be replaced by young pups with lots of new tricks.... If we fail to make room for new people and technologies, if we fail to reward the creation of new instructional tools in the same way we reward paper-based publication, university education will become increasingly irrelevant to the greater society outside academia's walls."

Marc Leeds
Associate Professor of English
Shawnee State University
AAHESGIT Listserv on the Internet
March 1994

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NEWSBRIEFS

OPPORTUNITY TO BE PUBLISHED

The editors of *Technos*, a quarterly journal about information technology for all levels of education are looking for responses to specific questions, with the possibility of publishing the responses in upcoming issues of the magazine. Respondents may write on one or all of the following questions: What role should large companies be expected to play in offering access to copyrighted electronic information to schools? In what ways can the education community ensure its strong voice in the discussion of the National Information Infrastructure? What suggestions do you have for solving the problem of too many "dinosaur" computers in U.S. classrooms? Should the education community concern itself with the research, development, and instructional design of virtual reality materials for the classroom? What suggestions do you have to include teachers in the process of technology implementation in their schools? Should students be restricted from accessing potentially objectionable materials on the Internet? How can instructional integrity be preserved and violence eliminated in new interactive multimedia for the classroom?

To send responses (due by May 1) or for further information, contact the Editor, *Technos Quarterly*, c/o AIT, Box A, Bloomington, Indiana 47402; (812) 339-2203; technos@linknet.com.

GRANTS FOR NETWORKING

The Commerce Department has announced a $26-million Telecommunications and Information Infrastructure Assistance Program to support networking initiatives in universities, libraries, local governments, and other not-for-profit organizations. The grants will pay up to half of the cost of the initiative, which must demonstrate how being hooked up to a network helps the organization.

Grant applications will be accepted through May 12 and the awards will be announced by the end of September. For more information, contact Charles Rush, Office of Telecommunications and Information Applications, Commerce Department, Room H-4889, 14th Street and Constitution Avenue, N.W., Washington, DC 20230; (202) 482-2048; tiiap@ntia.doc.gov.

CUMREC CONFERENCE

"Exploring New Directions" is the theme of this year's College and University Computer Users Association (CUMREC), hosted by The Ohio State University, to be held May 1–4 in Columbus, Ohio. The conference will include 42 paper presentations on topics such as multi-year budget modeling, new directions in training, reengineering, touch-screen information kiosks, and cutting budgets without cutting services. It also includes six panel discussions, open forum discussions and two post-conference workshops on networking issues at small colleges and how to get started with TQM.

For more information, contact CUMREC '94, The Ohio State University, P.O. Box 3602, Columbus, Ohio 43210; fax: (614) 292-1535; CUMREC94@osu.edu.

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From Theory to Practice: Three Good Books

Book Review

The Electronic Word: Democracy, Technology, and the Arts
by
Richard A. Lanham

The Learning Action Plan: A New Approach to Information Technology Planning in Community Colleges
by
Jan A. Baltzer

Touchtone Telephone/Voice Response Registration
edited by
Melanie Moore Bell

Among other theses put forward in *The Electronic Word: Democracy, Technology, and the Arts* by Richard A. Lanham (University of Chicago Press), is the idea that electronic text will revolutionize university curriculum. It is not so much computers themselves that will cause great changes as it is the fact that, enabled by computing, text is becoming a volatile medium, not subject to the same rules and limitations of conventional print. "Electronic text creates not only a new writing space but a new educational space as well. Not only the humanities curriculum, but school and university structures, administrative and physical, are affected at every point, as of course is the whole cultural repository and information system we call a library. In the university world, it is disciplinarity and its departmental shadow that will be most transformed."

It's very important that information technology professionals get the chance to look up once in a while from the trenches of having to get it all done every day and consider some of the enormous impact the work itself is likely to have, especially in education. This book provides such a chance in a very engaging, readable, and provocative way, and is well worth making some time for.

The Learning Action Plan: A New Approach to Information Technology Planning in Community Colleges, by Jan Baltzer, is published jointly by the League for Innovation in the Community College and CAUSE, the association for managing and using information technology in higher education. And what perfect timing this is, when the need for strategic planning is at an all-time high, and yet the consternation in most institutions surrounding the process of planning is equally high. This book lays out a plan to plan that many institutions, not just community colleges, will find enormously helpful. It also gives many examples and models that are successfully in use, as well as "suggested activities" to implement each step of the planning process.

Without trivializing the process, and never suggesting that this will be easy or simple, Jan Baltzer makes it clear what to do, how to do it, and most importantly, why to do it at all (for those two or three people out there who are still not sure that planning for information technology is necessary or important). The model described in the book is the Learning Action Plan model, the most salient characteristic of which is that it "does not focus on what types of hardware or software the IT organization must *buy* or *install*, as we have traditionally seen in most IT strategic plans. Rather, it focuses on what the IT organization must *do* to remain a vital and contributing part of the overall institution." Yes!

A very practical and down-to-earth book, *Touchtone Telephone / Voice Response Registration*, is a guide for the successful implementation of this technology, published by the American Association of Collegiate Registrars and Admissions Officers (AACRAO).

Ranging from selling the idea to actual implementation, the book covers laying the foundation, design and development, choosing a vendor, and communications strategies. It also discusses other applications for touchtone/voice response such as grade and student account inquiry. A very important point threading throughout is that registration affects many different, perhaps almost all, areas of a typical institution, and it thus behooves the planners of a major change such as this one to involve as many of those affected as possible.

The author team for this book is huge, made up mostly of registrars from a wide variety of institutions; it is, therefore, full of real-life experiences and anecdotes—a great way to learn from the triumphs and troubles of others.

Three good books representing targeted reading for those of us who do not have time to read fluff; time here will be time well spent. ■

The Decision-Making Process: as Important as the Decision ...

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right every time, but it can at least be the "rightest" possible under any given set of circumstances, and that's a lot. That alone should bring considerable comfort to the decision makers. The key is to follow a decision-making process that relies on definition, consensus, and commitment. The process is outlined in these steps:

Agree on the problem ________
This probably sounds obvious, but it is surprising how many times this step is skipped. And if the problem is anything more complex than where we should all go for lunch today, skipping this step will inevitably lead to trouble down the road in agreeing on the solution.

In a wonderful little book called *Are Your Lights On?*, Gerald Weinberg and Donald Gause tell the tale upon which the book's title is based. It's about a recently opened long tunnel going through a mountain, and the sign at the entrance to the tunnel telling drivers to turn their lights on before entering. That was fine, of course, but a big problem came up shortly after the tunnel was opened for drivers who forgot to turn their lights off after leaving the tunnel and who drove merrily on to their next stop and came back out to their cars discovering dead batteries. So the tunnel makers decided to put up a sign at the tunnel's exit. The problem then became what to put on the sign—it couldn't be a reminder to the drivers to turn their lights off, because if it was nighttime, or even excessively rainy or foggy, that would become an even bigger problem; in those cases, the drivers needed to leave their lights on.

And the decision-makers certainly didn't want a sign that had an "if" and a "then" in it, thinking it would become just too long to read as drivers were going by at normal highway speeds. Of course, just a simple reminder to turn their lights off at the next stop was thought to be silly—if the drivers couldn't remember to turn their lights off, they certainly would not remember the sign either. They even thought of dispensing with signs entirely and just putting a battery-charging station at the next stopping point.

The solution finally appeared when the decision-makers went back to ask themselves what exactly the problem was that they were trying to solve. They weren't trying to get drivers to turn their lights off. What they were really trying to do was to give drivers the opportunity to make the right decision for whatever their own circumstances were when emerging from the tunnel. Thus the sign, "Are Your Lights On?" became the solution.

> *In the case of a new technology strategy, define the challenge first. In the case of a new system, do the needs analysis first. In the case of a new product, specify the requirements first. Absolutely do not proceed from this step to the next until everyone has agreed what the problem is.*

One of the principal advantages to arriving at a common problem definition, besides getting everyone working in the same direction, is that it will become more apparent whether the difficulty being addressed is the "real" problem, or just a symptom of an underlying, perhaps more difficult, problem. For instance, let's say you're struggling with a long list of complaints from the Registrar's Office about one of the people in your office recently assigned to help them. The Registrar's Office claims that this person on your staff is simply unresponsive to their needs, and they are very unhappy with him. The problem here *appears* to be that the staff member is a real loser, and as a result, is delivering poor service to this important user office. This problem could be solved by replacing the person in question, but the fallout of doing so is likely to be large, and there's no guarantee that his replacement won't have the same problem.

However, looking at the situation more closely, it turns out that until a couple of months ago, the staff member had been devoted exclusively to COBOL programming on a mainframe and had never even used a microcomputer. The Registrar's Office, meanwhile, has been busily developing some local systems using Paradox on a microcomputer, and has been expecting this person to support them. He was put into the no-win situation of supporting a user who knew a lot more about the computer than he did, and became, as a result, unresponsive. When *this* becomes the problem definition, steps can be taken to solve it properly.

Agreeing on the problem can be a very difficult thing to do, but a good decision is much more likely to result if this is done. In the case of a new technology strategy, define the challenge first. In the case of a new information system, do the needs analysis first. In the case of a new product, specify the requirements first. Absolutely do not proceed from this step to the next until everyone has agreed what the problem is.

Decide who will decide

Higher education differs from the business environment in a number of ways, a key one of which is the dispersion of decision-making authority. Of course, this dispersion has some advantages in a collegial environment, but it can also make it unclear as to who is supposed to actually make which decision.

Before looking at alternative solutions to the problem, decide who will make the decision. Form a committee, if appropriate, or charge an existing committee with the task. Although committees have developed a bad reputation over the years for being cumbersome, overly deliberative bodies in which not much of value ever gets done (a popular old saying in the business world is that a camel is a horse designed by a committee), when used properly, a committee can be the best way to facilitate decision making in a collegiate environment, especially to enhance the communications process.

Lay out the alternatives fully

Each alternative solution has its own set of costs and benefits, advantages and disadvantages, all of which should emerge during this step. Even if some of the costs are hidden and some of the benefits are difficult to quantify, it's important to fully describe them nevertheless.

What you want to develop here is a complete picture of the likely consequences, both good and bad, of each of the possible solutions. This will make it much easier later on to actually make a decision, since it eliminates the fear of the unknown (at least as much as possible—it can never be eliminated entirely).

Get reasonable amounts of additional input

Whoever has the responsibility of making the final decision, whether that is a single individual, a committee, or whatever, should solicit as much input as makes sense for the scope of the decision. That is, the larger the problem, the challenge, or the opportunity, the more input is needed to deal with it. It's most important to get input from the people who will be most affected by the outcome.

> *A popular old saying in the business world is that a camel is a horse designed by a committee; when used properly, however, a committee can be the best way to facilitate decision making in a collegiate environment, especially to enhance the communications process.*

It's also important to be genuine and honest in soliciting advice and consultation. Paying this task just lip service—pretending to pay attention—will do more harm than good. For big decisions especially, it's best to assume that there are lots of people who should be asked their views, and to include as many of them in the process as possible. The benefits can be enormous; not only might someone come up with a great solution, it also provides an opportunity to build investment in the success of the final decision, whatever it turns out to be.

In general, people will be much more willing to make a solution actually work if they have been asked what that solution should be.

Generate consensus

Chances are that if everyone has agreed on the problem definition, it will not be too difficult to come to a consensus on the solution, especially with some compromise among the parties involved. This does not mean that the decision will be unanimous necessarily; that is usually an unreasonable expectation, especially for big decisions. But it is not unreasonable to expect that *most* people involved will think the solution is a good one and *no one* involved will think it is completely unworkable. Again, by this time, lots of people should be invested in the success of the outcome, and will want to make the decision really work.

Make the decision

This sounds obvious, but it is amazing how often this just isn't done. It is necessary to allow a reasonable amount of time to make the decision—but not a moment longer. It is important to know when extending the time to "get more information" is just a delaying tactic due to some discomfort with actually choosing among the various possible solutions.

Make the decision. Take a stand. Be willing to make the commitment and deal with the consequences. The really interesting thing is that in many cases, any decision is a good one, as long as the process leading up to the decision was itself a good one. ■

Using Technology to Empower Students

by Peter Havholm, The College of Wooster

One of the most important questions that colleges and universities should be asking themselves right now is: What kind of teaching and learning do you want to encourage with technology, and how does it fit with what you do best now? There is too little of this kind of questioning abroad, yet the answers can help each institution shape its technology environment to best serve the needs of its students.

At independent residential liberal arts colleges, our competitive advantage is that we provide hands-on, student-involving educational experiences in problem-framing and problem-solving. This is exactly the education most pragmatically suited to the twenty-first century, in which leaders in all fields will be those who can create new jobs, new markets, and new paradigms as the old collapse around us. Events are finally showing how inappropriate career-driven educational programs are, now that careers appear and disappear weekly.

In this context, there are two broad movements in the adaptation of technologies to the classroom in higher education. One is the lecture-decoration movement. The other is the new-tools movement. (I ignore for polemical purposes the third main stream of innovation: the cyberlibrary, like *Perseus*, *Martin Luther King, Jr.'s Letter from Birmingham Jail*, etc. These are for everyone, the magnificent, ultimately portable reserve lists of the future.)

The lecture-decoration movement conceives education as the conveying of information in a lecture in a huge hall in a huge university. Once one begins with that conceptual framework, then multimedia is a godsend. It can get students as involved as if they were watching MTV. They will remember much more from a lecture in which the main points are punched home with illustrations, animations, and sound. And, in the study sessions supervised by graduate students, students will gain much from self-paced interactive exercises in their carrels.

But if a small liberal arts college conceives of the value of technology only this way, it ignores its competitive advantage. It doesn't make a lot of sense to multimedia up a course whose normal enrollment is (say) 15 or 25. Since enthusiastic, sensitive, responsive teachers are still most effective in stimulating students to engage in critical thinking in such environments, why spend lots of money to bring in the big technological guns which are more appropriate for those huge lecture halls our admissions folks evoke to help our prospects have third thoughts about State U?

At small, liberal arts colleges, technology should be used to empower students. That starts with making sure that the environment encourages the use of standard computer tools: word processors, spreadsheets, electronic mail, on-line card catalogues, and the Internet.

I'd be surprised if we were doing anything at Wooster that isn't being done elsewhere, but our particular combination of approaches might be interesting. We do not require students to buy computers. On the other hand, our infrastructure (which extends from an Internet connection available in every room to free paper in the laser printers in every residence hall) encourages everyone to use one, and well over half the students end up owning one. There are enough public access machines and roommate sharing deals, apparently, because no papers get typed or hand written anymore. This environment was installed in 1986, during which year two students wired one of the first residence halls ever to be networked and the first to be networked by students. (Those two students are still doing fine: he's a systems programmer at Apple and she's an executive at Cray.) They were also active on the committee which developed and implemented our present computing policies.

Teachers in all disciplines are gradually incorporating Internet references into their teaching along with library references. (All faculty have computers in their offices and our library is on-line, etc.)

In the classroom, technology should be used to extend what students can *do* rather than to sink them deeper into their chairs. For instance, we have developed a program that allows English students to model the operation of literary theories. My class just completed a set of Russian Folktale generators using this program. They have created programs that tell stories according to their understanding of Vladimir Propp's *Morphology of the Folktale*. In the process of doing so, they read Propp to pieces because they had to "teach" him to a computer which required translating him into formal terms. Now that

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Peter Havholm is a faculty member in the Department of English at The College of Wooster. This article first appeared on the AAHE listserv on educational technology as a response to a question by Steve Gilbert on what trustees ought to be thinking about.

we have their generators, we can have bang-up discussions in class about what (if anything) Propp leaves out in his understanding of stories. Is there anything about stories that the formal model fails to capture? (None of these students knows how to program anything, of course. This software, just short of a real programming language, has been used successfully by sixth-graders.) This kind of active learning, including spirited discussion, is also in play when folks in the social sciences use simulations.

Several of our faculty are also experimenting with the group editing process. Software we have available allows seven or eight people (at seven or eight dispersed computers) to edit the same document at the same time. Moreover, it allows them to post messages which all can read, and it logs those messages. There are three positive results from this. First, students teach each other about decision making with respect to argument, style, and clear syntax; they write down their suggested revisions as part of the conversation. Second, the instructor has a log of the process that can help her/him pinpoint issues that deserve class time. Third, these serve as study groups where everyone learns more about collaborative learning.

We're excited about this; we expect to learn from it in ways we cannot now anticipate. We are also at work on (and ultimately looking for a grant to help us implement) a campus-wide system of departmental experts who will be responsible for maintaining discipline-specific collections of this kind of software and associated manuals and reports on its uses. They will also develop collections of materials that can be used by people who want to create multimedia projects. At Wooster, however, we want students to create the multimedia projects because they decide such a project would convey more than an ordinary essay would. We're not all that interested in having faculty turn discussion classes into movie lectures.

The important thing for small, liberal arts colleges like ours is that it makes more sense to follow the tools model than to adopt the lecture-decoration model for technology use. We're small enough, flexible enough, and sufficiently sophisticated about education to be able to teach students to use the technology as one more set of tools useful for critical thinking. We have the resources to do it; it's what we do best; and it is arguably what everyone most needs anyway. ■

> **"The role of the professor will be radically changed in the new automated university. Since professors will no longer be expected to teach the basics of a course (the computer-tutoring software will do this), their efforts can concentrate on discussion of larger conceptual material and small seminars.... Lectures will be largely eliminated. Professors will teach at least twice as many classes and reach many more students, spending about the same or less time as now in direct contact with students. The professor's role will become more of a manager of the educational process and a designer of educational software content."**

Gerald Smith and Jerry Debenham
The University of Utah
"Automating University Teaching by the Year 2000"
T.H.E. Journal
August 1993

In Future Issues

- *The latest Myths of Information Technology*
- *The ten habits of highly effective campus IT directors*
- *The future of public computing labs: betting on the students*

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EDUTECH RESPONDS

Q. We definitely need to do something very different with our administrative systems—they are old, inflexible, and hard to change, and they don't let users get to the data very easily. We get constant complaints about it. I have developed a proposal to change everything, including replacing the hardware and all the software and rearranging our staffing, and I think it's a very good proposal. It focuses on both short-term and long-term benefits, and it puts them in terms that everybody will understand and appreciate. My dilemma is this: it's going to cost a lot to make this change, and we're in a very tough budget situation. I know this proposal is the right way to go, but if I include all the probable costs, I don't think it will be accepted. On the other hand, if I make the costs look as palatable as they need to be in order to be accepted, I will end up having to "go back to the well" later on for more money (although there might actually be more money later on).

A. *Inadvertently underestimating the costs of technology is bad enough, but it sounds as if you might be thinking of doing it on purpose to get approval of your proposal. Absolutely not a good idea. It's your responsibility to lay it all out, and you need to do that as honestly as possible. Two things that might help: get others to endorse the benefits in the proposal, so that it comes from a wider base than just the computer center. And develop alternative financing plans so that the impact can be spread out over a longer time. (The vendors you are working with can help you with this.) Be honest in the proposal—deliberately lowballing the costs is a recipe for disaster.*

Q. We're about to introduce our new Internet connection to the campus. Is there a no-fail resource we can offer to new users?

A. *If there is, we haven't seen it. Probably one of the best, however, is Zen and the Art of the Internet: A Beginner's Guide by Brendan Kehoe (available in softcover from Prentice Hall). The Internet is a wonderful thing, but it makes us think that instead of discussing the smoothness of the information highway, we should be discussing the turbulence of the information ocean.*

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Providing Information Technology Services to Higher Education

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The Education Technology Newsletter for Faculty and Administrators

Faculty Uses of Computers: Fears, Facts, and Perceptions

by John Hirschbuhl, University of Akron

I have been working with computers and instruction since my early days at Penn State where I started out in 1968. It is a little easier now, but the survey results I am going to share with you indicate (to take a little bit from Louis Perlman) that the faculty know the words and they know the music, but they have chosen for the most part not to dance.

We surveyed the schools in the Ohio State University system to find out about faculty usage of computers. In 750 returns, we found that ninety percent of the faculty were using computers; however, only ten percent were using them in the classroom. That result indicated to us that it is not that faculty do not know how to use computers; it is not that they are unaware of computers; and it is not that they are afraid of computers. They are willing to use them for their own purposes, but they are reluctant to use them in the classroom. We wanted to try to find out why.

The study we did examined differences on eleven variables between faculty who were computer adapters (the minority) and the instructors and faculty who were not adapters (the majority). The study was intended to identify the factors that would give us clues about what we in information services need to do to influence faculty to make more use of technology in the classroom. We were trying to find out not only to what extent faculty are using computers in their instructional activities, but also whether personal attributes (discipline, rank, research commitment, and gender), organizational factors (instructional policy, incentives, technical support, and staff development), and attitudinal factors (computer self-efficacy, comfort, computer utility beliefs, and general attitude towards computers) affect faculty adaption of com-

continued on page 4

"For students, learning will no longer be limited to the lecture hall; learning will take place where and when students want it to. And electronic 'agents' will help them to access the world's knowledge and build their own personalized databases. For faculty, technology will help to develop customized courseware they can deliver electronically to their students. I don't think it will ever replace the human connection between teacher and student, but technology will certainly give both of them more choices and more flexibility concerning how, when and where learning takes place. And that's an exciting prospect, don't you think?"

Michael Spindler
President and CEO
Apple Computer
"Apple and Higher Education"
Educom Review
May/June 1994

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NEWSBRIEFS

DATATEL SCHOLARS FOUNDATION ANNOUNCES AWARDS

Datatel, a leading supplier of higher education administrative system software, has announced the awarding of $100,000 in scholarships to 100 students from Datatel's more than 270 client sites. The monies will be awarded through the Datatel Scholars Foundation and will be used for study during the 1994–95 academic year. The Foundation was established by Datatel in 1990 to continue its commitment to higher education by assisting students in furthering their scholastic endeavors.

Interested students apply through the financial aid office at one of Datatel's client sites. The criteria include motivation, academic merit, other activities including employment and extracurricular, and letters of recommendation. For more information, contact the Foundation at (703) 968-9000.

NEW PUBLICATIONS AVAILABLE

Technology in Student Affairs: Issues, Applications, and Trends has been recently published by the University Press of America. Written by John Baier, a professor of higher education at the University of North Texas, and Thomas Strong, director of student services at the University of Alabama at Tuscaloosa, the book provides a comprehensive guide to computers and communications technology in student affairs. It is intended for student affairs practitioners, graduate students, and graduate preparation program faculty members. Available in paperback ($32.50) or cloth ($52.00) from the University Press of America, 4720 Boston Way, Lanham, MD 20706; 800-462-6420.

Self-Assessment for Campus Information Technology Services, by Linda Fleit, is the twelfth in the CAUSE Professional Paper series. This paper contains a comprehensive checklist for self-assessment, covering the areas of planning, policies and procedures, facilities and staff, products and services, organization and external relationships, and funding. The questions were developed to have a direct relationship between the answers and their probable implications and consequences, so that problem areas can be defined and improved. The paper is being sent to all CAUSE member representatives. Additional copies are available for $12 for CAUSE members and $24 for non-members from CAUSE, 4840 Pearl East Circle, #302E, Boulder, Colorado 80301; (303) 449-4430.

ASCUE CONFERENCE

The 27th annual conference of the Association of Small Computer Users in Education (ASCUE) will be held this year on June 12–16 in Myrtle Beach, South Carolina. The theme this year is "Problems and Solutions." Presentations and pre-conference workshops will address strategic planning, multimedia presentations, use of the Internet, classroom concerns in computer science, local area networks, use of technology in various curriculum areas, and ethical concerns in the academic environment. For more information, contact Dagrun Bennett, ASCUE secretary, Franklin College, 501 East Monroe Street, Franklin, Indiana 46131; (317) 738-8150; bennett@minnie.franklincoll.edu.

The EDUTECH REPORT is published each month by EDUTECH International, 120 Mountain Avenue, Bloomfield, Connecticut, 06002-1634; (203) 242-3356. President and Publisher: Linda H. Fleit (LFLEIT@MCIMAIL.COM); Vice President: Emily Dadoorian. Copyright © 1994, EDUTECH International. All rights reserved. This publication, or any part thereof, may not be duplicated, reprinted, or republished without the written permission of the publisher. Facsimile reproduction, including photocopying, is forbidden. ISSN #0883-1327. One year subscription, $97.

TMOTF Hypotheses

by Steve Gilbert, American Association for Higher Education

Note*: In our March 1994 issue, we ran an article by Steve Gilbert about his new project, Teaching Materials of the Future (TMOTF). Since then, as part of the project's Phase I, Steve has drawn up hypotheses to be tested, confirmed, or modified in Phase II. A listserv on the Internet has been actively discussing these and related issues. To subscribe, send an e-mail message to:*

LISTSERV@GWUVM.GWU.EDU

with the text:

SUBSCRIBE AAHESGIT

and your first and last names. You can also reach Steve at AAHE, One Dupont Circle, Suite 360, Washington, DC 20036; (202) 293-6440.

- There is no revolutionary shift in the use of teaching materials; that is, in the next 18 months we will not be shocked by radical or overwhelming changes in the way that higher education conducts the fundamental activities of teaching and learning.

- On the other hand, more faculty will become convinced that the structure of the knowledge in their fields, the pace with which that knowledge changes, and the changing skills and composition of their students cannot be well-served by traditional textbooks—especially as it becomes easier to use sets of smaller-than-book print items and new applications of technologies.

- The transition to using sets of smaller-than-book print items and integrating information technologies into the curriculum is well begun and irreversible. The results will eventually transform the practices and nature of education.

- The next ten years will see even more varied and successful educational applications of information technology than the past ten years.

- Faculty are and will continue to be central players in determining the pace, extent, and nature of integrating information technology into the curriculum.

- Faculty roles will vary more than now, with some continuing traditional teaching practices while others become involved in using technology and more collaborative approaches to teaching and learning.

> *The goal is ideally balanced combinations of teaching, learning, scholarship, and community. Communal activities will be in balance with opportunities to pursue individual interests and work in environments supportive of individual needs and abilities.*

- The applications of technology that will be adopted most widely and rapidly are those which are made easiest for faculty to learn and use.

- For the next few years, the use of the Internet by faculty and students will be among the most rapidly growing educational applications of information technology.

- Some departments, some disciplines, and some kinds of institutions are more likely than others to continue to have faculty who select and assign entire books as part of their course materials.

- To achieve full use of the flexibility and variety of teaching materials that are becoming available requires a more active departmental commitment to maintain a coherent, effectively articulated curriculum in which students moving from one course to the next do not arrive inappropriately prepared.

- The number of students who decline to buy assigned textbooks will continue to increase. Efforts aimed directly at students to increase their perception of the value of textbooks in general will have little favorable impact.

- The needs and preferences of teachers and students influence the development of teaching materials. The nature of available teaching materials influences how faculty teach and how students learn.

Long-term goal

The goal is ideally balanced combinations of teaching, learning, scholarship, and community. Each student and each faculty member should be able to have a sustained and sustaining experience as part of an ongoing intellectual community where teaching and learning are central and human relations are nurtured and cherished. Communal activities are in balance with opportunities to pursue individual interests and work in environments supportive of individual needs and abilities. ■

Faculty Uses of Computers: Fears, Facts, and Perceptions ...

continued from page 1

puters in the classroom. It turned out that the attitudinal factors were far more influential in the decision to use computers for instructional activities than any of the other variables.

Discipline-specific

We found that a faculty's discipline did relate to the use of computers in the classroom; faculty who adapted computers in their instructional activity tended to be in technology-oriented disciplines. This does not necessarily square with conventional wisdom or with what other people have found in their own research. But according to our survey results, faculty seem to be more willing to use computers if they are in what are seen to be more computer-oriented disciplines. They tend to believe that computers are useful within their professions, and their attitudes towards computers are, in general, more positive.

We also found, however, that the other attributes we surveyed, factors of gender, rank, research commitment, instructional policy, incentives, technical support, and staff development, are not significantly different between people who adapt and those who don't adapt. That result was a bit of a rude awakening for me because for most of my career, I have been running around telling people that all we have to do to get faculty using instructional technology is to provide the right incentives, give them time, and make it less penalizing for them to work with technology. These survey results came as a big surprise to me, and it will be interesting to see if other research bears this out.

Our study indicated that the faculty who adapt computers in the classroom are not externally motivated; they are internally motivated. It is an internal decision. It is an attitude. It is not a reward, non-reward situation.

The key is attitude

What can we in IS do about this, given that the typical things that we have promoted for so long turn out not to be as important as we thought?

> *It is not that faculty do not know how to use computers; it is not that they are unaware of computers; and it is not that they are afraid of computers. They are willing to use them for their own purposes, but they are reluctant to use them in the classroom.*

One thing we have got to do something about is comfort. An example: when I went to review material recently for a presentation I was scheduled to make and loaded one of my files onto the computer I would be using for the presentation, I saw that something was wrong with the italics in the text. Even though it was the same program I had been running on my own machine; even though it was at the same level; even though it was the same kind of computer; here I was about to go in front of a large group with a glitch. We have to do something about that, because not everybody has the time or the inclination to check this out two or three times before they need to use it. They want to be able to load and go.

The comfort level just isn't high enough even with Windows and object-oriented implementations. A screw-up is a screw-up even if it is a GUI. Faculty are afraid of that and do not want to take that risk. One of the survey replies I got back repeatedly said "I'm not willing to perform a high-wire act without a net and so I keep the computer out of the classroom." I think that tells us a lot. It's not that faculty think their students don't need computer skills, they just believe that someone else should provide them. We have to think about increasing the comfort level.

Then there is self-efficacy. Our interpretation of this term is that it is believing that the computer is important to the students; that is, if they graduate from the institution without computer skills, they will be at some sort of disadvantage relative to others who have computer experience. Therefore, as a teacher, I want to take away that disadvantage by using the computer with my students so that I keep my part of the bargain. I think that idea is the key to what drives faculty members to use computers in the classroom. According to our study, if faculty do not feel that technology is important, they are less likely to adapt it for use in the classroom.

What about faculty time? How much time will faculty spend in preparing to use computers in the classroom? There are pressures for publication, there are pressures for

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John Hirschbuhl is an assistant to the vice president for information services at the University of Akron. This article is based on a paper given at the 1993 EDUCOM conference.

meetings, there are pressures for reports, and there are pressures for teaching. Where is the time for the hundreds of hours it takes to really build something significant to do this effectively? It's usually called "squeeze it out between everything else." How do we get anyone, especially a faculty member, to commit to that?

Perhaps the most effective approach to solving the problem of the investment of time starts with training. Beginning with some kind of orientation to computers and providing the faculty with enough facility to handle classroom technology may allow them to look at it in a serious way and decide how they want to use it. They don't want to be told by us—the information services group—what the best way is to do it. I think an information services group does better by leading rather than telling; letting the faculty decide how they want to use it is more important than telling them how they can use it.

Another thing has to do with differences among faculty. We keep thinking that there is some magical system that we can create to fit everyone. But what we really need is flexibility, not sameness. We have to recognize that the use of computers in the classroom and how it is applied is different from discipline to discipline; even within disciplines there should be different approaches. It is different when you are trying to teach writing in a composition class from when you are trying to teach someone how to do statistics in a research class. In the English class you might require multimedia with an emphasis on film clips and films made from the works of Shakespeare; for statistics you might want to use a software package that has sophisticated graphics. One size does not fit all.

Recommendations

We have several recommendations which emerged as a result of this study. First, we need to improve faculty attitudes about computers, especially in terms of their comfort and feelings of competence. We need to stop giving them these horrible error messages such as "Fatal error -- call IS before you do anything else." That terrifies people who are not used to using these things, especially when that message comes up in a public place like a classroom.

> *We keep thinking that there is some magical system that we can create to fit everyone. But what we really need is flexibility, not sameness. Even within disciplines there should be different approaches.*

Second, we need to require training in instructional development as an important faculty duty. I think universities, by and large, have been remiss in their attention to what it takes to build effective instruction. I think we need to do a little more with instructional design and show people the benefits in time savings and effectiveness when they use technology. We need to provide some way of teaching people about this idea so they can incorporate it into their own thinking and apply it to their own needs.

Third, we need to decentralize computing facilities. For a long time at the University of Akron, one of the things we promoted was the idea of centralized pods of computing for students around the campus. What we have found is there is just not enough floor space to do it. We are going have to spread the facilities out and put them among the departments and among the colleges, while at the same time providing support to them. In order to serve everyone effectively, we have got to spread the availability of resources among the users rather than continue to centralize it.

Fourth, we have to allocate funds in some way so that those who want to purchase software can, in order to avoid the long workup time involved in building their own. I often see instances on my campus where a faculty member decides not to buy a package because of its cost and ends up spending much more in time building it. It does not make sense. We need to realize that software purchase is probably a more productive way of getting computers utilized by faculty than having faculty build software themselves.

We also have one summary recommendation. This is to policy makers who have the job of deciding whether to make computers more available. Before that decision is made, the faculty needs to be made comfortable. And you do that by making them knowledgeable and capable of handling computers for themselves and for their students through some form of training. Once the faculty is comfortable, then they can decide how to use it; then it's time to tackle the availability issue. If you make technology available before the faculty has decided to use it, you can end up with underused facilities. ■

The Needs Analysis: Laying the Foundation for the Information Systems Project

The needs analysis, the first and most important step in an information systems project, has several goals, and each of these goals is accomplished through particular means.

Defining requirements

First, the needs analysis serves to develop a written document which expresses the full set of requirements in a new campus information system. That is, the needs analysis document that results from this step should clearly delineate what functions and characteristics must be present in a new information system for the institution to deem it "successful."

End users and potential end users of the system should be the ones who define the requirements—as opposed to the "old days" when system requirements were often defined by a single individual at the institution, or by the computer services department. In order to accomplish this goal, a series of interviews should be done, designed to be both comprehensive and far-reaching, with each of the users, potential users, supporters, and managers of the new system.

These interviews should typically involve as many individuals as possible, including clerical staff, department managers, faculty, students, top administrators, and the president. Each interviewee will be looking for something different from the system, and the different levels of information needs should be taken into account: the day-to-day operational level that keeps the institution running; the tactical level typically needed by mid-level managers; and the strategic long-range level of information, usually needed by the president and vice presidents in helping to plan for the institution itself.

The interviews should be low-key in the sense that there should not be demands or expectations that the interviewees know anything about technology, nor even that they have thought very far into the future about their needs. Typically, many people *have* already thought a great deal about a new information system by the time a needs analysis is done, but some may need assistance in thinking about the system, or in stretching their imaginations to new tools and techniques that they have not yet thought about. Interviewees should be able to discuss their own work, what they need to accomplish, how they might be already using technology, their good and bad experiences with it, and so on. These are things that people know just from doing their jobs every day, so there is very little, if any, advance preparation needed for the interviews.

> *End users should be the ones who define the requirements—as opposed to the "old days" when system requirements were often defined by a single individual at the institution, or by the computer services department.*

An interview would normally run about 45 minutes; and they are done with both individuals and groups, depending on the area. If possible, they should be held in the interviewee's office.

Encouraging collaboration

The second goal for the needs analysis is to lay the groundwork for the collaboration that will be needed throughout the project to bring it to a fully successful conclusion. The collaboration begins with the committee set up to facilitate the software selection process, typically an administrative computing advisory committee. These people should not only represent a good cross-section of the institutional community, they should also represent offices which will need to begin working together in new, and perhaps unexpected, ways once an integrated system begins to be implemented.

The new information environment represented by a new administrative information system is usually a very different one than the one the institution is replacing, and requires interdepartmental connections and communications that will be greatly facilitated by the work of the members of the committee to understand each other's areas. An idea that continually needs to be emphasized is that the committee (and others) needs to be looking at what's important *for the institution*, balancing (not necessarily optimizing) what's best for each department individually.

In addition, the needs analysis supports collaboration and teamwork by giving everyone a sense of participation in the process, and thus, a reason to invest in the success of the outcome. Unfortunately, history is littered with information technology projects that have failed because the system "solutions" were forced on the people who were most responsible for making the systems work. In this process, the inclusion of all of these folks in the needs analysis sends the signal that their opinions are valid and valued, and gives them a reason to be willing participants in the implementation later on. It also provides an opportunity to work with people's natural resistance to change.

Beginning to reengineer

The third goal for the needs analysis is to begin the process of reexamination of the nature of the work that people do, and the ways they go about accomplishing that work. This is the first step toward what some call "reengineering" the institution: looking for ways to make the accomplishment of the institution's objectives both more efficient and more effective. To accomplish this goal, the interviews should always focus on the *what*, not on the *how*. That is, what ought to be documented in the needs analysis is *what* people are trying to accomplish, not *how* they accomplish it now. New methods for accomplishing tasks and jobs will emerge later on, as different software systems are considered, and as opportunities present themselves to do things differently. Thus, a needs analysis is not a "systems analysis" in the older sense of that term; it is not a description of the use of current forms or a collection of flow diagrams to trace information transfers. Nor is it a set of specifications from which programmers can start writing code. It is simply a description of what a new information system needs to do to be fully effective for the campus.

The needs analysis should also reflect that the institution is constantly changing in its information needs, and that there is a certain set of future needs which cannot be articulated today. A new system should be able to accommodate new requirements as they arise. This idea is different from some years ago, when most of us were under the mistaken impression that an information system could be specified at a single moment in time, and then developed to meet that specification. We know now that this was very unrealistic; in order for an information system to be truly useful, it must be flexible in its structure and characteristics.

The result of the needs analysis is a written document that specifies both general and specific system requirements in broad, objective-oriented terms. Once the institution signs off on that document as being an appropriate representation of its needs, it can be turned into a Request For Proposal, to be sent to vendors of information systems for higher education. ■

> **"I doubt that we have ever seen so much enthusiasm and happy speculation regarding the vast opportunities for massive improvement of the human intellect as took place during the birth and adolescence of modern computing machines.... These remarkable new machines, it was predicted by some of the brightest academics of the day, would free human minds from tedious mental labor, thereby enabling those minds to more vigorously pursue intellectual goals at much loftier levels. Sad to say, there's not much evidence to support those early predictions."**
>
> Gordon Sherman
> University of Tennessee, Knoxville
> "Campus Computing: Education or Edutainment?"
> *Educom Review*
> May/June 1994

In Future Issues

- *The latest Myths of Information Technology*
- *The ten habits of highly effective campus IT directors*
- *The future of public computing labs: betting on the students*

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EDUTECH RESPONDS

Q. We recently combined our administrative and academic computer departments into a single unit, and now we are trying to set up the right committees to provide the new department with advice and communication. More than a few people have suggested that we need both administrative and academic advisory committees, but doesn't that defeat the whole purpose of having combined the two service areas? We want to be able to consider information technology for the college as a whole, and not continue the artificial divisions between administrative and academic users. It seems to me that these two committees will just perpetuate the old way of doing things.

A. *That is a valid concern, but actually, it is probably more important to have these two committees when there is a combined service department than with separate departments for academic and administrative computing. While we are certainly seeing a blurring of the boundaries between academic and administrative users, it is an evolutionary phenomenon. One of the devices that will help ameliorate feelings of being submerged (especially among the faculty) is to have an advisory committee concerned just with academic needs: technology use in the classroom, in support of research, enhancing communications with one's colleagues, and so on. Similarly on the administrative side, there are areas that still require specific attention, and can benefit from being addressed by separate committees.*

Q. In trying to decide whether we should buy a new administrative system software package or write our own, one thing that worries us is the customization that has been done for us over the years by our computer people. We see the need for new software, but we don't want to lose any of those special features.

A. *One of the best features of modern administrative packages is the ability to be customized without a huge amount of programming. Adjusting the ways things are done by the system or adding new features is not nearly the onerous task it used to be. In addition, many of the things we used to consider "special features" are now part of off-the-shelf software packages. Fixed assets, for instance, or degree audit, which used to require custom programming, are now standard features in most of the major packages.*

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Providing Information Technology Services to Higher Education

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The Education Technology Newsletter for Faculty and Administrators

The 7 Characteristics of Highly Effective IT Services

When a book stays on the best seller lists for over three years, it's a safe bet that there is something of substance in it, something important to be gained by reading it. Such is *The 7 Habits of Highly Effective People* by Stephen R. Covey (published by Simon & Schuster, New York). In it, Covey describes seven habits that individuals can use to contribute to their leadership potential, thus increasing the chances that they can make a positive difference to themselves, their families and loved ones, and society at large. Covey describes a process of habitual behavior which leads to achieving goals, building healthy relationships, and becoming a fulfilled, principled person.

As valuable as these habits may be to individuals, however, they can also be thought of as valuable organizational characteristics—characteristics which, if held in abundance, can make an information technology department be the most effective group on campus. With a tip of the hat to Stephen Covey, the following lays out a model of a highly effective IT service department.

#1: Be proactive. Computer centers spend a great deal of time reacting—to problems, to users, to changes in the technology, to the administration. Understandable, to be sure; because of the nature of the environment, the need to provide service, and the rapid changes going on all the time, being able to react effectively is an art unto itself. But reacting is often done at the expense of being proactive. A common example of this is the IT department that is always trying to juggle the workload based on its own interpretation of priorities. This is inevitably a no-win situation; the IT people are in the position of not only delivering the services, but of deciding who should get how much and when, and therefore, constantly having to react to political pressures, squeaky wheels, and so on. A more effective approach is to take

continued on page 6

"Let's keep in mind that it is possible to design an information superhighway that will approach the Administration's vision and to do so without causing undue pain—but not unless reasonable deliberation is exercised, 'people issues' are addressed from the early stages, and the right players are brought into the planning process. Those players must include social and behavioral scientists."

William Howell
American Psychological Assn.
"How Social Scientists Can
Contribute to the Information
Revolution"
Chronicle of Higher Education
June 8, 1994

NEWSBRIEFS

TWO CONFERENCES NOT TO BE MISSED

Both EDUCOM and CAUSE have officially announced their 1994 conferences. The EDUCOM conference, "Transforming Education: Measures & Milestones," to be held October 31–November 3 in San Antonio, Texas, will feature Anita Jones, Director of Research and Engineering for the U.S. Department of Defense and George Gilder of the Discovery Institute. There will be both pre- and post-conference seminars and workshops and the conference itself will have concurrent, discussion, and poster sessions and vendor displays, all centered around information technology in higher education. For more information, contact EDUCOM at 1112 16th Street, NW, Suite 600, Washington, DC 20035; (202) 872-4200; Internet: conf@educom.edu.

The CAUSE conference, "New Opportunities for Partnering," will be held November 29–December 2 at the Walt Disney World Dolphin in Orlando, Florida. Also with pre-conference seminars and workshops, the conference itself is centered around seven major themes in higher education information technology: partnering; focus on the customer; information as a strategic resource; networking; new technology; information technology architectures; and professional development. There will also be corporate participation in the form of exhibits, demonstrations, and presentations. For more information, contact CAUSE at 4840 Pearl East Circle, Suite 302E, Boulder, Colorado 80301; (303) 939-0315; Internet: conf@cause.colorado.edu.

IN CASE YOU HAVEN'T BEEN OUT OF THE OFFICE ENOUGH OR IN THE UNLIKELY EVENT YOU HAVE SOMETHING LEFT IN THE TRAVEL BUDGET

Two other important conferences are coming up shortly. The 25th Annual Seminar on Academic Computing, known more familiarly as the Snowmass Conference, will be held this year August 7–10 in Snowmass Village, Colorado. Entitled "New Technologies and Services: The Front Range of the Next 25 Years," the conference will have sessions on a wide variety of information technology topics, including the future of academic research; distance learning; revisioning the libraries; and electronic publishing. In addition, there will be an Executive Program on August 5–7 entitled "The NII and You: The Impact of the National Information Infrastructure on the Academe." This program is meant for senior officers of colleges and universities whose responsibilities and interests encompass high-technology services such as computing and communications. For more information on Snowmass, contact Debbie Bird, Conference Director, Coordinator of Summer Sessions, Oregon State University; (503) 737-2052; Internet: birdd@ccmail.orst.edu.

A higher education technology conference sponsored by Syllabus Press will be held August 14–17 at the University of California–Santa Cruz. Syllabus '94 is a conference for faculty, department chairs, administrators, and technology staff who want to learn more about multimedia; quantitative, simulation, and visualization technologies; and graphics and presentation technologies. For more information, contact the Syllabus Press Conference Desk at 1307 S. Mary Avenue, Suite 211, Sunnyvale, California 94087; (800) 773-0670; Internet: syllabus@aol.com.

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MEMORANDUM

To: Bill Carson
From: President Roberts
Subject: Decentralizing Computer Services

Bill, I have an idea that I'd like you to consider. As our Chief Information Officer, you will be able to give me some insight into whether I'm off track here or not.

From everything I read, computers are getting smaller, faster, cheaper, and easier to use. Yet the university's costs to provide computing to everyone who wants it grows every year. It seems to me that one reason for this is the enormous financial burden represented by both a large mainframe computer and a large staff of professional computer people. Both of these resources are very expensive for us. Is it possible that the economies of scale that one would imagine are achievable through maintaining a centralized computer facility are not, in fact, really there? Is it possible that by eliminating the central facility in favor of more department- and user-based computing, we could save a great deal of money?

My thought is this: instead of maintaining a large, expensive, and increasingly behind-the-times central computer facility, we should be enabling departments to have their own computers. Naturally, these computers would be much smaller and much less expensive to acquire and maintain than our present computer, and therefore, would provide an opportunity to reduce our hardware expenses. In addition, with such an arrangement, we would also not need the large and highly technical staff we have now (of course, the staff would be reduced humanely, using such devices as transfers, attrition, early retirement, and so on).

Taking this further, and assuming my thinking is correct so far, I don't really see the need to have any centralized computing in the future. Of course, we would have to phase into this, but it seems to me that, given current hardware trends (not to mention the university's financial situation), the entire decentralization could be achieved sooner rather than later.

Let me know what you think about this. I know I can count on you to approach this objectively, and to give me your best advice. Even better than just your advice would be the outline of a plan to take the university to a decentralized computing arrangement, within, say, a year or so. Thanks.

BEST COPY AVAILABLE

Information Technology and the University: Integration Strategies for the 21st Century

by Donald N. Langenberg, Chancellor, University of Maryland System

In a world driven increasingly by brain power instead of muscle power, one institution stands out in its capacity to enhance human life through learning: the university. The aphorism "knowledge is power" is manifest in every aspect of our increasingly complex society. Information is the essential raw material of knowledge and the learning that makes it useful. During the millennium now nearing its end, the university has become an indispensable source of knowledge and learning. In assuming that special role, the university's primary tool has been an information technology rooted in the revolutionary medieval invention of printing with moveable type. Now, as we approach the threshold of a new millennium, the university confronts a new revolution in information technology whose implications are as profound as those of the revolution launched by Gutenberg.

Universities bear a major responsibility in guiding the evolution of today's information technology. Universities are in the business of creating, processing, and disseminating information—the business they were in long before the advent of western-style democracies, the industrial revolution, or the information age. As we all struggle to understand, assimilate, and apply the dramatic technological advances of the information age, the challenge to the university community becomes increasingly clear: to integrate information technology with the university's canonical teaching, research, and public service missions in ways that best serve society. Those institutions that succeed in meeting this challenge will be the coming century's "most valuable players."

Colleges and universities are, of course, already heavily engaged in meeting the growing demand for information-age services. Library resources, information services, and distance education are just three areas where institutions are stretching shrinking resources to meet this demand—a demand that originates increasingly with such non-traditional clienteles as adult learners, independent researchers, and start-up businesses.

The information age confronts universities with challenges beyond those of providing new services to new clienteles. Pressing ethical and legal issues involving copyrights, privacy, and proprietary rights demand attention. Scholars and administrators must acquire new skills in accessing, using, and evaluating information resources. Indeed, every citizen will need these skills to some degree if we are to avoid becoming an oligarchy of the information elite. And, as successive transformations of information technology appear with ever-increasing frequency, universities are challenged to maintain the time-honored fundamental value of open access to and communication of information and knowledge. Much of the power of modern science derives from the dedication of scientists to this value, having long been at the heart of the ethos of the global community of scholars. It must remain there if we are to gain full benefit from the advance of information technology.

Considerations such as these are prompting the nation's universities to begin restructuring themselves to better meet the needs of today's learners. Responding to shifting demographics, shrinking fiscal resources, and ever-growing demands for services is the focus of this restructuring process, a process affecting both academic and administrative programs. If these restructuring initiatives are to succeed in the long run, however, they must integrate "strategically correct" information technologies to the fullest extent possible.

New Patterns for Research

New information technologies are altering the way research is conducted, and indeed, the very definition of research itself. Information technology has done much to lessen constraints of time, cost, and distance on the community of scholars. For a start, it is profoundly changing the way researchers communicate and collaborate. Instantaneous information-sharing is spawning a host of new collaborative research arrangements. Electronic mail is replacing paper and telephone among many communities of scientists, who are coming to rely on computer networks for conversation and exchanges of text, data, and images. A truly national research network is one of the major advances made possible by strides in information technology. This emerging network has created the conditions for new collaborative efforts not only among scholars, but among the broader academic community, government, and the industrial sector. Multimedia and imaging are adding new dimensions to the research enterprise.

Researchers are continually finding new ways to apply information technology to do old things faster, better, and cheaper, and to do entirely new things that only yesterday appeared impossible.

Technological advances have also generated an explosive growth of information and data. The Internet's capacity for transmitting data has grown exponentially since 1991. Today, the backbone of the National Science Foundation (NSF) network supports roughly six terabytes of information, an amount that approximates the information content of an entire large university library. One result of this is the boosting of our analytic capabilities beyond the wildest dreams of researchers of a decade ago.

These examples of information-technology-based research advances serve to underscore the intimate connection between information technology and the university. They also point to the university as the logical point of interface between these technologies and society at large. As we witness successive transformations of technology and communications during the coming years, it will become increasingly important for universities to institutionalize these advances in ways that will serve the needs not only of researchers, but of society itself.

Strategies for Tomorrow

Successfully integrating information technology with higher learning in the 21st century will demand attention to two basic needs: the ongoing need for *service* to individual users, and the need for *leadership* in integrating technology and learning. By *service* I mean providing users of information technologies with the information they seek, with the tools to evaluate and apply that information, and with the capabilities for information exchange. Providing service also means understanding and meeting user needs, not dictating them. The basic services users need include Internet software and guidance; gateways to the National Research and Education Network (NREN); local infrastructure with access to the Internet through a local-area network; and adequate local technical support.

Users also need a reasonable degree of freedom from concern about adequacy of resources. Meeting the information needs of users must become a major priority, not only within computer centers, but in academic departments, in the offices of deans and presidents, and in boardrooms—in other words, from the individual scholar to the highest echelons of university governance.

Beyond service, leadership will be needed to advance technology-linked learning. At the heart of this challenge is the ability to develop a clear vision of the role of information technology, and communicating that vision to the world at large. The vision must be clear to both current and potential users, and it must preserve the ideal of free and unfettered access to ideas as the basis of intellectual and societal progress. Such leadership must also be based on the ability to move beyond pursuing information technology for technology's sake to envisioning its real potential for transforming both universities and society.

Leaders within our colleges and universities must be prepared to guide and manage change. Every institution needs leaders with a clear understanding of the power of information technology and the central position it occupies in the future of higher education.

For now, each institution will need to forge its own vision. Varying histories, missions, goals, and resources will mean different strategies for the integration of information technology with institutional structures and traditions. At the outset, much of the impetus for change will probably focus on telecommunications offices, computer centers, and libraries. An important element of the needed change is the integration of these entities, as technology dissolves the distinctions among telephones, number crunching, and books. This is already occurring in some institutions; and increasingly, new alliances will emerge. These alliances will greatly advance the integration process.

With a strong service orientation and strong leadership, higher education can position itself to shape, and not just be shaped by, the next steps of the information revolution. Many current efforts are, admittedly, embryonic. But we must pursue them vigorously if we are to avoid the costs of failure to exploit the stunning potential of the new technologies, or worse, mindless acceptance of them.

Information technology will inevitably and profoundly alter every aspect of university life, both within our walls and in our partnerships with society at large. As we make the leap from typeset tomes to binary books, the university must assume the primary responsibility for ensuring that advances in technology are matched by advances in learning. ■

Donald Langenberg is the Chancellor of the University of Maryland System. This article is reprinted with permission from John Wiley & Sons, Inc. from the Journal of the American Society for Information Science.

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The 7 Characteristics of Highly Effective IT Services ...

continued from page 1

the initiative to help establish an institution-wide mechanism for setting priorities, so everyone has a chance to determine and buy into the criteria for high-priority work. This may not be, of course, something that the computer center can do alone. It may require the use of influence, bargaining, deal-making, politicking and so on. But all of that is part of being proactive—taking the initiative to make a bad situation better.

Being proactive means looking for problems to solve (before they become huge and insolvable) and, even better, looking for new opportunities to exploit on the institution's behalf. It means taking the initiative and being resourceful. It means being more in control, rather than being controlled by external forces. Most computer center people have more opportunities to be proactive than they may realize.

#2: Begin with the end in mind. The need to plan, to set goals and objectives and to develop a roadmap for achieving them is one of the most critical needs for an effective IT department. Planning begins with developing a mission statement and a good way to do that is for the IT people to ask themselves, "When I no longer work here, how do I want to be remembered?" The answer to this will help create the vision toward which all IT activities should be pointed.

Technology is not an end unto itself. It is only necessary and important to the institution when it is serving the institution's goals and objectives and when it is actually producing results. Beginning every project with that end in mind will ensure that everyone perceives the IT department as making significant contributions to the institution.

#3: Put first things first. Once a plan, with priorities, is in place, it needs to be carried out efficiently. This requires strong management. It may mean having to occasionally get people to do something even when they don't want to, or when it's a particularly difficult task. On the other hand, it may mean stopping people from doing something that isn't as important, although it may *seem* more urgent at the time. Putting out fires has been a major activity for IT services ever since there have been campus IT services; it may be necessary to rethink that strategy, and to consider what is important rather than what is urgent.

> *Putting out fires has been a major activity for IT services ever since there have been campus IT services; it may be necessary to rethink that strategy, and to consider what is important rather than what is urgent.*

#4: Think win-win. Too often, the relationship between the IT services department and the users is a competition, or even a full-scale battle. Conflicts over the quality and quantity of services, adherence to schedules and plans, who is in charge of technology projects, and so on, form the backdrop for many computer center activities. A more effective approach is to not think of the users as enemies, but rather, as partners in a cooperative, collaborative venture. The users' success does not mean the computer center's failure; quite the opposite. Success in a technology project means success for everyone involved, and there can be plenty to go around.

Creating win-win situations means always looking for the third alternative: not all our way, not all their way, but a third way which encompasses everyone's perspective. This requires a good deal of trust, courage, and consideration. It also requires a focus on results rather than on methods.

#5: Seek first to understand, then to be understood. This is the very essence of effective communication—to be able to truly hear and appreciate what is being said by another person, then to encourage understanding of one's own position. Nowhere is this more important than in information technology, which has a language and a vocabulary all its own, and which is very different from the language and vocabulary of the users. Does everyone in the IT services department understand what is meant by the terms, "enrollment management" or "capital campaign"? Do the IT people really understand how difficult it is to get up in front of a classroom full of students to teach every day? IT people need to listen to the users, and to understand what is being said to them. And it is just as important to listen to the feelings being expressed as it is to the words. Learning to read body language is as critical a part of understanding meaning and content as looking words up in a dictionary.

In a higher education environment especially, this need to communicate effectively extends beyond the spoken word to writing well. So much of what goes on in a typical college or university happens in writing, and in fact, depends on effective writing skills to happen at all. It is so common and so easy for some on campus to take potshots at the computer people because of a lack of writing skills, and yet this is a relatively easy situation to correct.

Being highly skilled technically is a critical asset for an IT services person. But so is being able to communicate well with others on campus who do not share that background, or even the interest in technology. It is important to understand fully the users' frames of reference in order to apply technology effectively to their problems and opportunities.

#6: Synergize. Synergy is basically creative cooperation. It is the ability to tap unused potential so that the whole of whatever is being combined is greater than the sum of its parts. It goes beyond simple cooperation and looking for compromises. It takes the differences between points of view and rather than trying to minimize or eliminate them, the creation of synergy actually values the differences and capitalizes on them to work out a way to cooperate creatively.

Naming co-directors of an important technology project, one from the IT services department and one from the user department, could be a good example of this. Having each one see the project from the other's point of view and working toward a common set of goals, objectives, schedules, and resources, can lead to a much more effective project result in the end than if either did it alone.

#7: Sharpen the saw. This is the characteristic that makes all the others possible. It comes from the adage of the logger who was working too hard and taking too long to cut down a tree with a dull saw, but who didn't want to take the time to sharpen the saw because he was too busy trying to cut down the tree!

Building the other six characteristics into the IT services department requires standing back from it for a while, getting out of the day-to-day fray, and consciously making some changes.

This can be enormously difficult to do, especially if one's focus remains on just the short-term. But the responsibility of the IT services department to its institution goes way beyond the short-term. It extends to the long-term viability of the institution in becoming, if highly effective, what could easily be the institution's most strategic resource.

***The 7 Habits of Highly Effective People: Restoring the Character Ethic* is available in just about every bookstore in the country, or for $11.00 from the Fireside Division of Simon & Schuster, 1230 Avenue of the Americas, New York, New York 10020.** ■

"The issue is not, should we use emerging technologies in helping people learn?; we can't control that. Today, most people get most of their information electronically, through TV or radio or videotaped movies or computers or whatever. The issue is, can we in education use these technologies to help people learn, thereby retaining at least a partial share in the future education business?"

William Campbell
University of Wisconsin-River Falls
AAHESGIT listserv on the Internet
Moderated by Steven Gilbert
American Association of Higher Education
June 1994

In Future Issues

- *Principles of good data administration*
- *The future of public computing labs: betting on the students*
- *Encouraging faculty to overcome technology resistance*

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EDUTECH RESPONDS

Q. Our academic computing committee has made a recommendation to provide every full-time faculty member on our campus (approximately 100) with a desktop microcomputer. The committee has made very compelling arguments in favor of this proposal, and they have developed a hardware leasing plan that will make the financial burden of this initiative manageable. My question has to do with their notion of a "baseline" system: providing the same microcomputer for every faculty member (although there will be a choice between IBM and Apple). Wouldn't it make more sense to have the hardware fit people's needs, presumably with a variety of configurations?

A. *It would seems so, at least at first glance. However, that approach itself can lead to a whole variety of problems. First, you have the problem of who is going to define "needs." Needs can change quickly, and a novice user today can become one with much more demanding needs very rapidly. Defining needs also gets you, or someone, into the business of distinguishing between "needs" and "wants." This inevitably leads to having faculty members justify their requests, thereby potentially defeating one of the purposes of providing equipment across-the-board. The other big problem is with support; the more varieties of configurations you have, the more it will take to support them all properly. In an initiative like this, support is going to be a critical success factor, so you will want to give that aspect of the project every chance to succeed. One or two systems for everyone could be a very good place to start, allowing sensible variation as time goes on.*

Q. Our auditors have repeatedly insisted that we develop a disaster recovery plan, covering both the central facilities and the users' areas. Is there a way we can do this without it being a big deal?

A. *Yes, in fact, not making it into a "big deal" is probably the most sensible approach for campus computer centers. First, it is important to evaluate the risk of a disaster actually occurring (for most campuses, this risk is low), and then to put as much resource into creating the recovery plan as is justified by the nature of the resources being protected. With the exception of payroll and registration, there is not a great deal of time-dependent, mission-critical, computer-supported activity on a typical campus.*

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More Great Myths of Computing

Faithful readers may recall an article of ours several years ago in which we described the Seven Great Myths of Computing (see page 6 for a summary). Our point at the time was that we, as computer professionals in higher education, have done ourselves and our users a major disservice by perpetuating ideas about technology that are rarely, if ever, true. By continuing to mold expectations around these myths, we contended, campus computer people were inadvertently setting themselves up for one crisis after another.

Unrealistic expectations among our users and institutional decision-makers is still probably the greatest challenge we face today. Yes, there is still a widespread lack of appreciation for technology at the upper reaches of our institutions, and yes, there is still a pervasive resistance among the faculty to get substantively involved with technology, and yes, there are severe economic woes throughout higher education that contribute to technology being underfunded in many institutions. Nevertheless, the size of the gap between what campus people expect from technology and what they actually get is an enormous problem, and one that is still being fed by the Myths of Computing. The original seven were bad enough; there now appear to be an additional four.

Myth #8: Someday, the Supply of Computing Resources On This Campus Will Meet the Demand. This is not likely to happen in our lifetimes, and is an especially destructive idea when used for long-range planning because it tends to lead to a series of one-time expenditures for technology, rather than a steady, reliable funding stream. Experience clearly shows us the fallacy of this myth. It doesn't matter how big the hard disk is that came with the microcomputer; it is going to be completely filled up in a shorter time than anyone predicts. It

continued on page 6

"How long will it take for some start-up company to repackage our course content by working directly with individual faculty members, buying up that person's lectures, and putting them on the telecommunications highway? In other words, unless we work as learning communities, teaching values, and engaging in experiential learning—really creating some transformation at a bedrock level—what's at stake is that colleges and universities may become the road-kill on the telecommunications superhighway."

Claire Gaudiani
Connecticut College
"Patterns of Reform in
Higher Education"
Liberal Education
Spring 1994

NEWSBRIEFS

CAUSE SURVEY SHOWS NETWORKING IS TOP CONCERN

Through a survey conducted with the University of Miami among over 500 higher education information technology managers, CAUSE, the association for managing and using information technology in higher education, has found that campus networking tops the list of concerns. An almost equally pressing concern is how to cope with limited resources; the third concern on the list is the challenge of aligning technology objectives with the institution's goals and objectives. The surveyed managers were asked to indicate their concerns among a long list that included aging administrative information systems, reengineering, and justifying information systems.

Survey results are broken down by type of institution. For a copy of the report based on the survey, *Information Technology Issues in the 1990s: An Analysis from a CAUSE Postcard Survey for 1994* ($9.20 for CAUSE members; $18.40 otherwise), contact CAUSE at 4840 Pearl East Circle, Suite 302E, Boulder, Colorado 80301; (303) 939-0310; Internet: orders@cause.colorado.edu.

INTERNATIONAL CONFERENCE ON TECHNOLOGY AND EDUCATION

The 12th International Conference on Technology and Education has issued a call for papers in preparation for its gathering on February 28–March 3, 1995 in Orlando, Florida. Entitled "Leadership for Creating Educational Change: The Magic of Technology," the conference will have ten tracks, including Cutting Edges in Educational Technology, Liberating the Curriculum, Distance Learning and the Global Village, People's Systems for Effecting Change, New Assessment Paradigms for New Curricula, and Technologies Enabling the Special Needs Student.

For more information and a copy of the Call for Papers, call (512) 471-4080 or request by fax at (512) 471-8786.

SUMMER WORKSHOPS AT IAT

The Institute for Academic Technology (IAT), a non-profit partnership between the University of North Carolina at Chapel Hill and IBM, is holding summer workshops for higher education people interested in information technology. The workshops include topics on Technology in Education: Principles and Practices, Planning a Learning Infrastructure, Designing and Using Technology Classrooms, Mastering Multimedia, Planning for an Internet Connection, and Developing Tools for Teaching. All workshops, many of which include hands-on practice sessions, are given throughout July, August, and September.

For more information, contact IAT at Research Triangle Park, North Carolina; (919) 405-1900; Internet: info.iat@mhs.unc.edu.

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Can We Talk—In Person?

by David Davenport, Pepperdine University

I have finally given in. After fighting it for years, I now have E-mail. And voice mail. And a fax machine. With a computer at the office, one at home, and a laptop for the road, I'm wired and networked to the hilt, loaded for bear in this fiber-optic world.

You know what I've discovered? Everybody's sending me information, but nobody talks to me anymore. The great irony is that with all we hear about the information superhighway and data streaking across the world, people are hunkered over their workstations and are talking to one another less and less.

This struck me most powerfully one day when I got up from my whiz-bang workstation and decided to engage in that ancient ritual of leadership, "management by walking around." With 1,000 people working where I do and 7,500 student customers, I have found this has been a useful way to stay in touch.

Five years ago, when I walked through the administration building, 75% of the people would look up from their work and talk to me. This time, all eyes were focused on cursors—there wasn't a moment of human contact. So much for my walk.

Later it occurred to me that many on that particular floor are fundraisers and public relations people whose constituencies are beyond our walls. How, I wondered, can we make the personal contacts and connections that warm people toward our institution if they're using only computers, faxes, and E-mail? I'm not sure we can.

The trick about all these devices is they make you look like, and even feel like, you are communicating when often you are not. After tapping keyboards and communicating through modems all day, we can go home properly exhausted and feeling effective, the warrior class of the new information age. But in fact, those of us in people-oriented fields now often make it through a day without any person-to-person communication at all. That may be very efficient, but is it really being effective?

> ***In the future, more people will work from home. We'll share data and coexist on interactive, on-line, electronic networks. Translation: User friendliness will replace people friendliness. But not to worry. The breakthrough with CD-ROM into virtual reality may lead us to virtual relationships.***

We cruise easily on the information superhighway, but lo and behold, most of us are no longer dealing directly with one another, and the person-to-person side of our work is quickly becoming the road less traveled.

On my university's organization chart, I have moved from the box at the top of a pyramid to a dot in the center of a circle. This was done for several purposes, but part of the reason for this non-hierarchical arrangement is to foster communication. But what I'm finding fostered is *more* communication, not *better*. Sometimes I feel like the "Midnight Cowboy" who left the quiet ranch for New York, only to find that "everybody's talkin' at me." Except they're faxin', E-mailin', and voice mailin' at me. More talkin' at me would be welcome!

In the future, more people will work from home. We will share data and coexist on interactive, on-line, electronic networks. Translation: User friendliness will replace people friendliness. But not to worry. The breakthrough with CD-ROM into virtual reality may very well lead us to virtual relationships.

Add it up and we're redefining the word *communicate*. We don't talk, we share data. Yes, we are transcending the barriers of time, space, and form. But that had better not make the personal handshake obsolete. Looking up from the computer screen, talking to our colleagues, and actually calling on the customer in person still work better than anything so far from Microsoft.

They say it is the simple idea that has staying power. How about this: We all switch our computers off for one hour tomorrow and talk to each other. ■

David Davenport is the president of Pepperdine University. This article first appeared in the June 27, 1994 issue of Computerworld, and it is reprinted with their permission.

Adaptive Technology that Provides Student Access to Computers

by Sheryl Burgstahler, University of Washington

Students with disabilities meet barriers of all types. However, computers are helping to lower many of these barriers. As word processors have replaced typewriters, electronic spreadsheets have replaced handwritten books, and on-line services have supplemented telephone and written communication, disabled students who have computer access have become capable of handling a wider range of activities independently. Although students with disabilities face a variety of barriers to providing computer input, interpreting output, and reading documentation, adaptive hardware and software have been developed to provide functional alternatives to standard operations.

Mobility Impairments

Input: Equipment which provides flexibility in the positioning of monitors, keyboards, documentation, and table tops is useful for many individuals. Plugging all computer components into power outlet strips with accessible on/off switches makes it possible for some individuals to turn equipment on and off independently.

Some adaptive hardware and software assist individuals with little or no use of their hands in using a standard keyboard. Individuals who have use of one finger, a mouth- or head-stick, or some other pointing device, can control the computer by pressing keys with the pointing device. Software utilities can create "sticky keys" that electronically latch the SHIFT, CONTROL, and other keys to allow sequential keystrokes to input commands that normally require two or more keys to be pressed simultaneously. The key repeat function can be disabled for those who cannot release a key quickly enough to avoid multiple selections. Keyboard guards (solid templates with holes over each key to assist precise selection) can be used by those with limited fine motor control.

Sometimes repositioning the keyboard and monitor can enhance accessibility. For example, mounting keyboards perpendicular to tables or wheelchair trays and at head-height can assist individuals with limited mobility who use pointing devices to press keys. Other simple hardware modifications can assist individuals with mobility impairments. For example, disk guides can assist with inserting and removing diskettes.

For individuals who need to operate the computer with one hand, left- and right- handed keyboards are available. They provide more efficient key arrangements than standard keyboards designed for two-handed users.

Some hardware modifications completely replace the keyboard and/or mouse for individuals who cannot operate these standard devices. Expanded keyboards (larger keys, spaced far apart) can replace standard keyboards for those with limited fine motor control. Mini-keyboards provide access to those who have fine motor control but lack a range of motion great enough to use a standard keyboard. Track balls and specialized input devices can replace mice.

For those with more severe mobility impairments, keyboard emulation is available, including scanning and Morse code input. In each case, special switches make use of at least one muscle over which the individual has voluntary control (e.g., head, finger, knee, mouth). In scanning input, lights or cursors scan letters and symbols displayed on computer screens or external devices. To make selections, individuals use switches activated by movement of the head, finger, foot, breath, etc. Hundreds of switches tailor input devices to individual needs. In Morse code input, users input Morse code by activating switches (e.g., a sip-and-puff switch registers a dot with a sip and a dash with a puff). Special adaptive hardware and software translate Morse code into a form that computers understand so that standard software can be used.

Voice input provides another option. Speech recognition systems allow users to control computers by speaking words and letters. A particular system is "trained" to recognize specific voices.

Special software can further aid those with mobility impairments. Abbreviation-expansion and word-prediction software can reduce input demands for text and keyboard commands. For example, word-prediction software anticipates whole words after a few keystrokes and increases input speed.

Documentation: On-screen help can provide efficient access to user guides for individuals who are unable to turn pages in books.

Blindness

Input: Most individuals who are blind use standard keyboards; however, Braille input devices and key labels are available.

Output: Voice-output can be used to read screen text to blind computer users. Special software programs "read" computer screens and speech synthesizers "speak" the text. The availability of earphones for this purpose can reduce the distractions for others nearby.

Refreshable Braille displays allow translation of the screen into Braille on a display area where vertical pins move into Braille configurations as screen text is scanned. Braille displays can be read quickly by those with advanced Braille skills, are good for detailed editing, and do not disrupt others in work areas because they are quiet. Braille printers provide output for blind users.

Documentation: Scanners with optical character recognition can read printed material and store it electronically on computers, where it can be read using voice synthesis or printed using Braille translation software and Braille printers. Such systems provide independent access for blind students. Some hardware and software vendors also provide Braille or ASCII versions of their documentation to support blind users.

Low Vision

Input: Most individuals who have visual impairments can use standard keyboards, but large print keytop labels are sometimes useful.

Output: Special equipment for individuals who are visually impaired can modify display or printer output. Computer-generated symbols can be enlarged on the monitor or printer, thereby allowing individuals with low vision to use standard software applications. For individuals with some visual impairments, the ability to adjust the display colors is of value, and anti-glare screens make screens easier to read. Voice output systems are also used by people with low vision.

Documentation: Scanners with optical character recognition can read printed material and store it electronically on computers, where it can be read using voice synthesis or printed in large print. Some hardware and software vendors also provide large print or ASCII versions of their documentation.

Hearing and/or Speech Impairments

Speech and hearing disorders alone do not generally interfere with computer use. However, advanced speech synthesizers are close enough to human quality to act as substitute voices and thus provide a compensatory tool for students who cannot communicate verbally. Students with these portable systems can participate in class discussions.

Output: Alternatives to audio output can assist the hearing-impaired computer user. For example, if the sound volume is turned to zero, a Macintosh computer will flash the menu bar when audio output is normally used.

Learning Disabilities

Educational software where the computer provides multi-sensory experiences, interaction, positive reinforcement, individualized instruction, and repetition can be useful in skill building. Some students with learning disabilities who have difficulty processing written information can also benefit from completing writing assignments, tutorial lessons, and drill-and-practice work with the aid of computers.

Input: Quiet areas and ear protectors may make input easier for individuals who are hypersensitive to background noise.

Software that aids in efficient and accurate input can also assist. Some people can compensate for high rates of input errors by using spell checkers, thesauruses, and grammar checkers. In addition, word-prediction programs (software that predicts whole words from fragments) have been used successfully by students with learning disabilities. Similarly, software that expands abbreviations can reduce the necessity to memorize keyboard commands and can ease the entry of commonly used text.

Output: Some learning-disabled individuals find adaptive devices designed for those with visual impairments useful. In particular, large print displays, alternative colors on the computer screen, and voice output can compensate for some reading problems. People who have difficulty interpreting visual material can improve comprehension and the ability to identify and correct errors when words are spoken or printed in large fonts.

Documentation: Some individuals with learning disabilities find it difficult to read. Computer documentation provided in electronic forms can be used by enlarged character and voice synthesis devices to make it accessible to those with reading difficulties. ■

Sheryl Burgstahler is the assistant director of computing and communications at the University of Washington and the director of DO-IT (Disabilities, Opportunities, Internetworking, Technology). This text for this article originated in her Ph.D. dissertation.

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More Great Myths of Computing ...

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doesn't matter how many microcomputers are out there on campus, there will never be enough. It doesn't matter how many programmers there are on staff, there will always be a programming backlog.

The challenge here is not to make supply and demand match, it is to manage both of them so that the right (the most important) demands are being met by an appropriate amount of supply.

Myth #9: If Only I Had Enough Time, I Could Learn Everything About the Software I Am Using. This would be wonderful, but it's just not true. There is no way to learn everything; there is no such thing as getting a complete handle on it anymore. That is a really uncomfortable feeling, to be sure, but it's something we're going to have to learn to deal with and to teach our users how to deal with. It's time they all stopped feeling so insecure about computing, and this myth has contributed hugely to that insecurity.

The Internet is a perfect example. The Internet is an incredibly messy, unstructured, unindexable, undefinable mish-mash of wonderful things. The only way to get things on it is to explore it. It's like an adventure game—you go into dungeons or dark caves, and pick up magic potions here and there, and occasionally, you'll find a treasure to bring back out of the dungeon. Some of the tools for exploring are getting better. But basically, this is a huge conglomeration of information that no single person is going to get a complete handle on.

There are dozens of other examples: the latest versions of *WordPerfect* and *Word for Windows* are but two. "Habitable" software, or software in which we find a comfortable space, is now much more the norm than software in which we have great facility with every feature.

The Original Great Myths

1. **The benefits of technology can be quantified, and the results of computerization can be measured.** The truth is that the benefits in an educational environment are often intangible and not measurable; that does not mean they don't exit.

2. **We can get all the bugs out.** Not a chance. The more we program, the more bugs there are.

3. **We know what other people do for a living.** We don't, thus making it incredibly difficult to design programs to help them do their work better.

4. **All we have to do is....** The truth is that it's never, ever that simple.

5. **Standards exist and there are models to follow.** There aren't really. Each new initiative is fraught with risk.

6. **Solving the technical problem means solving the problem.** Not even close. Nor do we necessarily *have* to do something just because we can.

7. **The workload of our computer center will be significantly reduced by using (fill in the blank) technology.** If anything, the effect of new technology is usually just the opposite.

Myth #10: If the User is Not Using the Technology Extremely Well, It's the User's Fault. Corollaries: the user has not spent enough time reading the manual; the user has not spent enough time playing around with the new software; the user doesn't know enough about how the administrative data is structured to be able to make his or her own reports. Hogwash!

The problem is the technology, the problem is not the user. A great example of this is the VCR. For years, perfectly sane, normal, intelligent people have run shrieking from the prospect of setting up their VCR to tape a program they are not going to be at home to watch. And what do we hear? Things like, "I don't know, I must be dumb or something, I just can't figure out how to do it. I can't even get the stupid light to stop blinking where the current time is supposed to be." Well, it turns out, it isn't the VCR user at all—it is the way the VCR is designed. The people who made up how to program a VCR did not give any thought to the people who would actually have to do it. Only now, years after VCRs were first introduced, are we beginning to see improvements in the human interface.

It's exactly the same with computers. Most of the so-called "user-friendly" tools are still too hard to use; they evolved from tools which were absolutely impossible to use unless you were willing to learn machine code or wire boards or go to school for six years. Yes, things are changing, but not very quickly. We need to stop blaming the users, or worse, letting

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the users blame themselves, for not using technology as much as they could be by now if it were as easy to use as the myth suggests. This is especially true of faculty.

Myth #11: As a Top Administrator, I Need to Know How a Computer Works in Order to Oversee Computer Resources on Campus. This is also called the "special knowledge" myth. One of the ideas that makes it difficult for college administrators to deal effectively with technology is that it is somehow fundamentally different from any other college resource. Many high-level administrators are convinced that some "special knowledge" is needed to make major decisions about technology, such as allocating resources and determining priorities. And because many of them do not have that special knowledge, they feel unprepared to deal with, and decide on, these important issues. But technology is not that different from any other college resource. It is newer. Some of it is more expensive. The guts of it are incomprehensible to the average person. But, in fact, these are not important differences. There is nothing special about technology. The "special knowledge" one must have to understand how technology works is not needed to understand how to deal with technology and how to manage it properly.

The other side effect of belief in this myth is that too often, people get put in charge of campus information technology who do know very well how it all works, but who do not have a clue about how to manage it.

Shattering the myths

Many years ago, we wrote, "If technology is to become part of everyday campus life without crises, without misspent resources, and without casualties, computer professionals must present their case to the technologically unsophisticated without creating an unbridgeable gap between expectations and reality."

This is as true today as it ever was, and perhaps more so since having actually experienced (or at least observed) many of these crises.

What are the realities? The most honest answer to this is that we don't know yet. We, do, however have some indications. The first is that the biggest payoffs in information technology are going to come in two areas: reengineering our institutions and transforming the teaching/learning process. The second is that most faculty need special assistance to get involved. And the third is that the total costs will be more than any institution can afford, even rich ones. ■

> **"Throughout the 1980's, we were invited to believe that computing and information technology were revolutionizing the conduct of teaching, learning, research, and communication throughout higher education. While the technological infrastructure of academe was indeed transformed, there is little basis for claiming that much else was. Unlike the academic computing enthusiasts..., I have no blithe predictions about academia's information-technology future. I would hope they are right, but I'm inclined to bet that they're not."**

Mark Shields
Georgia Institute of Technology
Letter to the Editor
The Chronicle of Higher Education
June 8, 1994

In Future Issues

- *Principles of good data administration*
- *Responses to our case study on decentralization*
- *What educational leaders in our colleges and universities need to know about IT*

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EDUTECH RESPONDS

Q. Much to the profound dismay of our administrative computing advisory committee, we have had to delay the cutover to our new information system for two months because of problems with one of the user offices. It seems to everyone that we have all bent over backwards to accommodate the needs of this office, but they have been non-participants in this project right from the beginning. We have done everything from setting up their tables to redesigning their forms, from creating new office procedures to creating new data elements for them, but they are never satisfied. They want the new system to look exactly like the old system; otherwise, it just won't do. Is there any way to get this office more in sync with the project?

A. *Getting everyone on board needs to be both a top-down and a bottom-up process. First, there needs to be widespread recognition that this is an important, even vital, project for the institution, and the message needs to come right from the president that everyone is expected to participate in its success. This may need to be reiterated (and even enforced) from time to time, especially when people "forget" that the new system represents significant enhancements over the old way of doing business. In addition, the people in all of the offices involved in the project need to be given a clear set of roles and responsibilities for enabling success, including helping to shape their technology environments to meet their own needs. You may have inadvertently contributed to the problem by relieving this office of the burden (and therefore, of the responsibility) for engaging in these important tasks. It's not too late to put it all back on course.*

Q. We worked very hard last year to create a strategic plan for information technology, widely read and accepted. This year, however, we're having a lot of trouble getting funding for the projects we laid out in the plan. What is the point of planning if there is not going to be any follow-through?

A. *It sounds as if a crucial step was missed—the one that links the IT strategic plan with the institution's budget. Without this important linkage, the plan is really only a wish list, and has not served as the basis for the campus to decide on its priorities. Adding this step will match expectations with reality.*

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THE EDUTECH REPORT

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The Education Technology Newsletter for Faculty and Administrators

What to Look for in a CIO

Your institution has just made a momentous decision. The president and the president's cabinet have decided to create the new position of Chief Information Officer, and they are about to begin a national search to fill the position. As happens very often, this decision has been made in response to major difficulties the institution has been having in planning for and managing information technology —budgets are out of sight, users are very unhappy, the computer center staff is floundering, and no one can seem to get a handle on all of the issues at the same time. Naturally, then, the institution will expect that the new CIO will be able to deal with these problems and get them fixed in some appropriate and timely ways.

But to look for a person who will just do that (not that fixing these problems will be at all trivial) is too short-sighted, because information technology is not just a set of *problems* (despite what many college presidents think); it is also a rich set of *opportunities*. Fixing these problems is indeed important, and will require a knowledgeable and experienced person, as well as a strong commitment from the institution. But guiding the institution toward being able to take advantage of the new opportunities presented by information technology is equally important.

What should an institution expect from a CIO? First and foremost, the CIO should be the institution's leader and advocate for information technology, by giving technology a vision, a focus, and a unified management direction.The CIO needs to help provide and promote a vision for the institution's use of information technology throughout all of its various endeavors. This quality of being a visionary is one of the most important things a CIO can bring to the table because it is the key to information technology fulfilling its potential in transforming our high-

continued on page 6

"People like variety and like to be challenged.... Why get stuck working on just one thing? When something new comes along, you know that your users are dying to see it, so don't hold back. Let them have it. Sure, early versions of software may have performance problems, clients may crash or hang up computers, data may be destroyed, incorrect information may be provided, software may be unavailable or difficult to install, but being able to use the coolest thing first easily makes up for those minor inconveniences."

Howard Jay Strauss, describing how to do a Campus-Wide Information System (CWIS) wrong
Princeton University
"CWIS Miss'"
CWIS
Spring/Summer 1994

NEWSBRIEFS

COMPUTING ETHICS KIT AVAILABLE

EDUCOM's program, Educational Uses of Information Technology (EUIT), has produced The Ethics Kit, the result of three years of work by a team led by Sally Webster and Frank W. Connolly. The Kit is intended to encourage discussion of the legal and philosophical issues surrounding campus computing and electronic networks. Sample computer ethics policy statements provide models for campuses to use in formulating their own statements, and materials, such as overhead transparency masters, are included to be used for seminars and classes on the ethical uses of technology. An early edition (1992) of the Institute for Academic Technology (IAT) bibliography on computers and copyright provides pointers to additional readings.

The Ethics Kit is part of the EDUCOM Series in Educational Uses of Information Technology, and is available from McGraw-Hill/Primis in New York for $25.00. For further information about the Kit, contact EDUCOM at 1112 16th Street, N.W., Washington, DC 20036; (202) 872-4200.

CAUSE INTRODUCES NEW ELECTRONIC NEWSLETTER

CAUSE, the association for managing and using information resources in higher education, has produced a new electronic newsletter for higher education. According to a news release from CAUSE, *Campus Watch* shares information for effective management of information resources and technology in higher education with stories about IT-related projects of note on college and university campuses. The newsletter also includes a forum for information exchange called "Campus Connections." The first issue, sent in July to CAUSE members and other subscribers, included items on an interactive archive for Shakespearian studies at MIT, a new information display system at Oklahoma State University, and the five community colleges to receive the first National Science Foundation (NSF) Advanced Technology Education grants.

Produced as a service to higher education administrators and information resources and technology managers, *Campus Watch* is available only in electronic form. Anyone may subscribe by sending e-mail with the message: **subscribe campuswatch** to mailserv@cause.colorado.edu.

CAUSE/CNI PLAN REGIONAL WEST COAST CONFERENCE

"Networked Information Access and Delivery: An Update for Computing Professionals and Librarians," jointly presented by CAUSE and the Coalition for Networked Information (CNI), is scheduled for October 4 and 5 in Fullerton, California. The conference is expected to attract some 250 college and university librarians and computing professionals to explore new ways in which institutions of higher education can use networks in support of academics and administration.

For more information or to register, call the CAUSE conference line at (303) 939-0315 or send e-mail to conf@cause.colorado.edu.

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Response to President Roberts

Editor's Note: Many people responded to our letter from President Roberts to his CIO (see our June 1994 issue) about the need to immediately begin decentralizing the campus' computing resources, and to develop a plan to have this done within one year. Typical comments (all quotes appear with permission):

"This is a classic case of the Popular Computing approach to managing resources—the president has read a couple of articles about the virtues of getting rid of the mainframe and all he (she?) can see is the potential for reducing costs. There is so much more to it, from the technical to the procedural, and a lot of the problems (the president would probably call them 'challenges') haven't been solved by anyone yet, including some of the largest companies with lots of resources. The whole notion of completely decentralizing within a year is totally unrealistic, and the effort will end up costing more than they save."

"Unfortunately, the president's demands do not take into account anything about networking. The only way decentralization can work is with a solid, reliable, pervasive network, which in itself requires a major financial investment. Even with a big investment, not many places have achieved this yet."

"Decentralization probably makes more sense as a *direction* rather than as a *goal*. While it's true, as the president says, that 'computers are getting smaller, faster, cheaper, and easier to use,' a centralized mainframe still make more sense as the main processor for information that needs to be shared among a large group of people (such as the data in an administrative information system). This will probably change over time, especially as distributed processing and networks become more reliable, but it's not likely to happen within the year being sought by the president."

"The CIO is in an especially tricky position here. To be a responsible information technology resource manager, he has to make a case that the one-year time frame is unrealistic. But he also has to be seen as a provider of solutions, not as an obstructionist, particularly regarding the president's wishes. He has to present reasonable arguments concerning the centralization/decentralization issue—with reasonable alternatives—without putting himself in a position of being seen as an empire-protector."

This is a classic case of the Popular Computing approach to managing resources—the president has read a couple of articles about the virtues of getting rid of the mainframe and all he (she?) can see is the potential for reducing costs.

"There are still economies of scale to be had in both the hardware and personnel areas. No one should be seduced into thinking that distributing processing power and technical people is automatically going to save a lot of money, at least, not yet. Just the time involved in making it all work properly will be expensive, especially since everyone will be learning as they go."

"What about backups, disaster recovery planning, data access, integration, security, and just the raw processing power needed to handle all the data on a typical college campus? These are not trivial issues, and are overlooked only at the institution's peril."

"Once again, we have a chief executive looking for magic solutions. This memo comes from a president woefully uninformed about information technology, and is going to get the institution in a great deal of trouble as a result. When are these guys (to quote Dick Nolan) 'going to get it'? There are no magic solutions; not decentralization, not client/server, not mainframe-dumping. All of these have benefits, sure, but they also have costs that need to be carefully examined. If just once, one of these presidents started looking at information technology as an investment rather than just a cost, we might get a set of more realistic expectations."

"The mainframe environment has served us reliably for years. It's stable; we've worked out all the major issues. Does this president know what risk will be incurred by totally changing that environment in such a short period of time? That's not to say it shouldn't be done at all, but the risk has to be understood and managed."

"It sounds to me like the problem is one-or-the-other kind of thinking on both the CIO's and the president's part. The real solution here is most likely a mixture of technologies, making the best use of the capabilities of each." ■

The Treason of the Learned

The Real Agenda of Those Who Would Destroy Libraries and Books

by Michael Gorman, California State University, Fresno

Libraries are under attack as never before, and none more so than academic libraries. The enemies of academic libraries fall into three classes. The *bureaucrats* know little or nothing of education or libraries. They know only that they cost a lot of money; money that could be saved if libraries were to be dismantled behind a smokescreen of technology. The *technocrats*, or at least some of them, believe that technology can be used to provide something equal to, or better than, "traditional" library services.

The *technovandals* want to use technology to break up the culture of learning and, in a weird mixture of Nineties cybervision and Sixties radicalism, to replace that world with a howling wilderness of unstructured, unrelated gobbets of "information" and random images in which the hapless individual wanders without direction or sense of value. Consider these words: "...learners increasingly can be free to determine their own learning paths divorced from the sequential, linear, directed flow of printed text, or the weight of authority. Responsibility for collecting, organizing, and analyzing information can be shifted from the provider to the end user. In the learning environment which (sic) is student centered and student controlled, learning becomes less structured and more associative, intuitive, dynamic, and potentially more creative. (From *Leveraging the Future: The Telecommunications Plan for the CSU/Academic Communications Network Committee of the Academic Information Resources Council* Draft, October 1993, p. 4.)

Money, power, and culture

These words, coming from my own university, did more to illuminate the thinking and motives of those who are dedicated to destroying academic libraries than anything I have heard or read before. Students, faculty, and librarians would do well to heed their warning and understand their implications for education and society.

> *The dispute that rages over the position and future of libraries in universities and university systems has always been about money and power. There is always a faction in administration that knows the price of libraries but not their value.*

The dispute that rages (mostly, but not always, covertly) over the position and future of libraries in universities and university systems has always been about money and power. There is always a faction in administration that knows the price of libraries but not their value. Most, if not all, librarians, faculty, and students know the value of libraries but do not control the funds necessary to preserve that value. Some of those who wish to choke off libraries are simply interested in gaining the power that would come from appropriating library funds and using them for computing and other technologies. If the report from which the above quotation derives is to be taken seriously, as it should be, it shows that the dispute is about learning, culture, and freedom as well as about money and power.

Easy targets

The recipe for wresting money from academic libraries and gaining the power that goes with it is simple. Begin by caricaturing libraries as "museums of compressed wood pulp" (a leaden phrase coined by the vapid Raymond Kurzweil), then treat any reaction to this caricature as emanating from fearful and backward-looking fuddy-duddies. Stir in a soupçon of sexism (most librarians are female and, therefore, cannot be expected to understand the brave, thrusting male world of computing) and lashings of infobabble about superhighways, wallet-sized libraries, libraries without walls, paradigm shifts, and in no time you will have an army of simpletons and co-conspirators nodding in unison at your insight and progressive thinking.

Beware the antibook forces

The antilibrary, antibook forces cover their greed and destructiveness with a veneer of respectability bestowed on them by some librarians and scholars who, seduced by unexamined claims about technology, become their unwitting dupes.

We would do well to do two things: First, to allow no promise or blandishment of those who would destroy libraries to go unquestioned. Second, to come up with a constructive program based on using technology to enhance library services, to preserve the best of what we have, and to rise to new levels of service.

We should not permit this positive acceptance of technology to be used against us by our colleagues and by those who exploit them. It often seems, to put it bluntly, that we can never do enough to satisfy that crowd. Nothing short of permanently barred library doors and bonfires of books will placate them. If anyone doubts this, he or she should read any of the numerous pronouncements about "a new secular ethic rooted in a nanosecond culture, virtual communities, and virtual reality experiences." (This quotation from *Leveraging the Future*, cited above, is typical.)

Challenging the technovandals

It is a refreshing but rare experience to read or hear from someone who questions the economic feasibility and practicality of the bookless future. It is even rarer to hear from someone who asks, "Even if we can do these things, why would we want to?" One person who asks these questions to brilliant effect is Walt Crawford, who, in a number of speeches, has summed up a host of issues, economic and technical, which go to the hollow heart of the antilibrary movement. I would like to touch on two.

It is indisputable that, in Crawford's words, "no electronic medium can even *begin* to compare with ink on paper for readability, particularly for sustained reading." It is also indisputable that the *best* resolution of the characters in transmitted light is greatly inferior to that of the characters in the *worst* printed text using reflected light.

There is no foreseeable answer to this problem. This means that, in the electronic future of the technovandals, any sustained reading will be done using expensive, resource-wasting printouts that are themselves greatly inferior to economical printed texts. Wait a minute, though! The technovandals believe that the sustained reading of texts is unnecessary and in itself a bad activity.

> *We should not permit this positive acceptance of technology to be used against us by our colleagues and by those who exploit them. It often seems, to put it bluntly, that we can never do enough to satisfy that crowd.*

Logically, there are only two positions to take. On the one hand, you can believe in the power of sustained reading to enlighten, teach, illuminate, and entertain and, therefore, must grant that the printed book is the best technology we have and are likely to have in the foreseeable future. On the other hand, you can believe in the dumbing down of society to a state of ignorance for the masses and "information" only for those who have money and want to make more.

Economic dystopia

None of the technovandals has addressed the economics of their dystopia in a convincing way. It has been pointed out that only between a seventh and a tenth of the cost of printed materials comes from printing and distribution. All the remaining costs will be incurred whether texts are printed or distributed electronically. Even if electronic storage and distribution were free (which they most certainly will not be), the savings are marginal.

All this has to be understood in the context of the massive costs of the destruction of the publishing industry and its replacement by a system funded by...whom? To ignore the economic foundations of a hypothetical world of digitized knowledge and information is to ignore the real threat to freedom that such a hypothesis represents.

The inconceivably massive capital required to destroy and replace print-based knowledge and information industries can only come from the government in alliance with mega-industry. Those that have the gold make the rules, and those who invest billions in the new digitized world will have control over every aspect of it. The potential for censorship, control of access to knowledge and information, and limitation of intellectual freedom is boundless. If librarians, scholars, and teachers acquiesce in this destruction, we shall, by our silence, be committing the ultimate treason to learning and to intellectual freedom. ■

Michael Gorman is Dean of Library Services at California State University, Fresno. This article first appeared in the February 15, 1994 issue of Library Journal and is reprinted with permission.

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What to Look for in a CIO ...

continued from page 1

er education institutions. And transform they must. The CIO needs to have that picture in his or her mind—not all of the answers, necessarily—but a picture of how the institution can fulfill its mission in better, more cost-effective, more responsive ways, through the use of information technology. The CIO needs to know how to translate technological possibilities into the fulfillment of the institution's needs.

Next, the CIO must be able to communicate that vision so that everyone hears and understands it, and most importantly, has the opportunity to buy into it. Certainly that requires having excellent oral and written skills, but it is also more than that. Communicating the vision means knowing who to communicate to, how often, in what forms and forums, and when. The CIO needs to know when to use influence, when to use persuasion, and when to use authority, and what quantities of each to use.

These are largely political considerations, often an area otherwise well-qualified candidates shy away from, but absolutely necessary for the CIO's success. The CIO needs to know how to build alliances both on- and off-campus, how not to waste one precious moment of the president's time, how to promote the information technology agenda, and, often, how to slug it out (collegially, of course) with others competing for the same pot of (limited) institutional resources. Comfort in dealing with a wide range of people, from the president to the clerical staff, from non-technical end users to highly technical computing staff, is also a necessity. These qualities of excellent communications skills have nothing to do with information technology and everything to do with people, yet they can often be the qualities that determine the CIO's chances for success or failure.

The CIO needs to foster an appreciation for, and a broad understanding of, information technology in a higher education environment, especially for the senior levels of the institution. He or she needs to serve as an educator, an instigator, and a constant reminder of the importance of information technology to the higher education enterprise. The CIO should be the primary person responsible for keeping information technology on the president's agenda—not with all the problems that have to be solved, but with all of the challenges that can be met through the use of information technology.

> ***The CIO needs to know how to build alliances, how not to waste one precious moment of the president's time, how to promote the information technology agenda, and, often, how to slug it out with others competing for the same pot of institutional resources.***

The CIO also needs to be a broad thinker, and be able to generate and encourage thinking about what's best for the institution's overall relationship with technology, rather than what's best for individual areas of the institution. The CIO needs to discourage department-level suboptimization and encourage institution-wide thinking. Again, this is going to be the best way for the institution to take full advantage of the opportunities presented to it by information technology.

In terms of resource management, the CIO has to help make sure that the institution is spending its technology resources wisely. That means controlling overlapping functions, resources, and services; controlling duplication of effort; and coordinating information technology activities for consistency. The CIO should provide a single locus of accountability for information technology quality at the institution. This is especially important in institutions where the full range of information technology resources may be in different departments. The CIO should have direct (best) or indirect (not as good, but usually workable) management responsibility for all of those departments, even if they are kept separate otherwise.

There is also a major planning role for the CIO to play. The CIO needs to facilitate both strategic and short-term planning for information technology and to ensure that planning is effective, creative, and purposeful. Planning activities should be participative, of course (yet another area where communications skills are important), making use of such devices as information technology policy committees, administrative and academic advisory groups, and so on, but it is the CIO who should coordinate all of this and keep it all moving in the same direction. It is also the CIO who should be charged with the responsibility for making sure that planning for information technology is fully consistent with, and in support of, the institution's own plans, goals, and objectives.

Is looking for a CIO the same thing as looking for a computer center director? Most emphatically, no. A computer center director provides direct management for one of the institution's important resources. A CIO provides the strategy on how to make the best use of that resource within the institutional environment. While of course there is some overlap, these are very different perspectives, with the former having emphasis on day-to-day, operational matters and the latter being more long-range and strategic. Can a computer center director be (or become) a CIO? Absolutely, as long as he or she can take on that broader perspective. This is neither easy nor trivial, but it can be done.

What should an institution look for in a CIO? At least all of the following: knowledge of, experience in, and appreciation of higher education; solid technical credentials in one or more technical areas: programming, network operations, systems management, hardware, database administration, operating systems, etc; an understanding of basic information technology operations, such as project management and capacity planning, and ideas about how to make those operations as efficient as possible in a service-oriented environment; experience in both budgeting for information technology operations and managing technical staff; experience in delivering information technology services to the university community, along with an appreciation for how best to support the educational goals and objectives of the university as carried out by the faculty and an understanding of how an excellent information system supports the administration; a philosophical approach which reflects an understanding of the role of information technology both in the overall institution and in higher education in general, along with a vision for how that role might change over the years; and experience in strategic planning.

In summary, the CIO needs to be a manager, a coach, an educator, a facilitator, a role model, and a technologist. Do such people exist? Yes, although not in abundance. The good news is that there are more of them all the time; the bad news—or at least, the cautionary news—is that for an institution to attract a well-qualified, experienced candidate, it must itself be prepared to make a major commitment to information technology. Beginning with the president, information technology must be seen in the light of what it can do *for* the institution, not only what it is doing *to* the institution. ■

> **"Improvements in the way colleges and universities deliver their product—knowledge—are just now becoming apparent, but only years after campuses were wired and courses revised to accommodate networking technology. The technical capabilities of graduating students and their ability to adapt to a rapidly changing workplace are often not reflected in a university's bottom line. In addition, networking technology has enabled universities to reach out to the non-traditional students who are increasingly representing the new majority of new learners. And no institution can know how many students it would have failed to attract without networked resources present on campus."**

Paul Evan Peters
Coalition for Networked Information (CNI)
"Blah Blah Cost, Blah Blah Cost,..."
Educom Review
July/August 1994

In Future Issues

- *Hot Issues 1994-95: our annual survey of our readers*
- *Principles of good data administration*
- *What educational leaders in our colleges and universities need to know about IT*

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EDUTECH RESPONDS

Q. We have a system development project that has been going on, believe it or not, for ten years. The number of users involved with the specifications, prototyping, and testing is very large, and they don't always agree among themselves about how all of the features should work. At a couple of points along the way, the administration was ready to scrap the whole thing in favor of purchasing a system, but for one reason or another, they were persuaded to keep going with this. Unfortunately, we (the systems people) have lost a tremendous amount of credibility, the users are all mad at each other most of the time, and we have spent literally millions of dollars; the worst part is that there is still no end in sight at this point. Any suggestions?

A. *What you are describing is pretty bad, but honestly, not all that unusual. Big system development projects are plagued by this sort of thing all the time. The major task at this point is to set some realistic, achievable goals and to get everyone to commit to them. This needn't involve the entire project; a small subset that will get people focused on a success rather than a major failure can be extremely helpful. This would also be a good time to lay out some new ground rules, using the subset as a model for the rest of the project: 1) specifications are to be approved by the person to whom the involved users report; 2) a change can be made only by that same person, and only with full knowledge of the costs (including the effect on the schedule) and benefits of the change; and 3) work on the full project should not be resumed until (or unless) this subset is successful.*

Q. Among other things, our user services group offers short courses in basic computing topics like using the campus network, word processing, spreadsheets, etc. Most of these courses are not well attended, and the people who do come have a lot of complaints. I know it's a traditional function for user services to do this, but is it a requirement?

A. *Not at all. You and the rest of your department should be concentrating on adding value to the users' work with everything you do. Basic courses can be delivered in other ways, such as videotape, and you could use the time you save in not offering courses on more productive, and appreciated, services.*

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THE EDUTECH REPORT

The Education Technology Newsletter for Faculty and Administrators

Hot Issues 1994-95

As higher education enters the 1994-95 academic year, information technology issues are more prominent than ever before (see insert in the centerfold). IT has taken a very visible place on our campuses, and while many top administrators and faculty still consider IT to be problematic and little more, many others are now recognizing the great potential of this resource. Through our annual telephone survey of our readers, it appears that several major information technology issues predominate the scene for this year.

Networking. Faithful readers will recognize this as *the* Hall-of-Fame issue, it having appeared on every survey we have done in the last ten years! Areas of concern include network infrastructure (getting it fully designed and developed, providing campus-wide access, and connecting the campus to the Internet); managing and supporting the network (keeping up with the demand and the traffic, switching hubs to improve performance, making sure it's all reliable); network security, especially regarding connections to the outside world; and, of course, overall network planning. And it doesn't end there; as one respondent put it, "It's not just for our own campus users; we have to provide network access for alumni, applicants for admission, companies, and on and on."

The single biggest access issue this year is extending the campus network to the residence halls. One computer services director told us, "This is absolutely essential since 60% of our students own personal computers." Another said, "We hope to see more class interaction and increased multimedia applications once we have students more connected." But there is concern as well, and not just about how much this all costs the institution: As one respondent said, "We have not addressed the issues of equity—those who have computers seem to be

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"[The best advice I can give college and university presidents is that they] should digitize their libraries and make them available from student rooms over computer networks. They should in general not restrict the resources of the college to the classrooms in it, but reach out from their own classrooms to students around the world who want to take courses with the excellent teachers available, while at the same time allowing the students on campus to reach out around the world. In other words, make your institution one that summons the best from universities everywhere, rather than focusing on the faculty and students that happen to be assembled at your particular location."

George Gilder
The Discovery Institute
"Talking with George Gilder"
Educom Review
July/August 1994

NEWSBRIEFS

ANNOUNCEMENT AND CALL FOR PAPERS

The *International Journal of Educational Telecommunications* (*IJET*) is a new scholarly, refereed, quarterly journal to be published by the Association for the Advancement of Computing in Education (AACE). Led by an Editorial Review Board of leading scholars in the field of educational telecommunications, *IJET* will be initially distributed to individual and institutional subscribers in print form; future plans include electronic access. The journal is currently accepting papers for publication consideration in its first issue scheduled for the first quarter of 1995, and for forthcoming issues.

As a contribution toward the advancement of the field, *IJET* will serve as a forum to facilitate the international exchange of information on the current theory, research, development, and practice of telecommunications in education and training. *IJET* is designed for researchers, developers, and practitioners in schools, colleges, and universities; administrators; policy decision-makers; professional trainers; adult educators; and other specialists in education, industry, and the government. Articles within the following themes are of particular interest: interaction—its value to students and implications for teachers; collaborative learning—case studies and evaluation of applications; design of telecommunications courses; integration with other course elements; and use of Internet resources in learning and teaching. To receive Author Guidelines or subscription information, contact AACE at P.O. Box 2966, Charlottesville, Virginia 22902; (804) 973-3987; aace@virginia.edu.

COMPUTERS ON CAMPUS NATIONAL CONFERENCE

The Computers on Campus National Conference will be held this year on November 13–16 in Myrtle Beach, South Carolina. This conference provides a national forum for showcasing computer-based instructional models, discussing successful experiences in networking, making effective use of computer support in academic assessment, and using technology to enhance student development. The conference is designed for academic faculties, especially those in the liberal arts, social and behavioral sciences, and education and the allied health sciences. It is also intended for student affairs professionals and academic support specialists charged with developing a computer-based learning environment that is a natural complement to the classroom experience. For more information, contact Computers on Campus, USC Division of Continuing Education, 937 Assembly Street, Suite 108, Carolina Plaza, Columbia, South Carolina 29208; (803) 777-9444.

FALL IAT SERIES ON INFORMATION TECHNOLOGY

Beginning this fall, the Institute for Academic Technology (IAT) will offer colleges and universities an opportunity to register for a series of three satellite broadcasts that use technology demonstrations and discourse to explore technological and pedagogical issues pertinent to the academic community in the information age. For more information, contact the IAT at 2525 Meridian Parkway, Suite 400, Durham, North Carolina 27713; (919) 560-5031; info.iat@mhs.unc.edu.

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Refocusing Central IT Support

by Dana Cartwright

Editor's note: This month's AAHE Bulletin contains an article by William Geoghegan of IBM on the need to provide different kinds of support for mainstream faculty than for those who are the "early adopters" of instructional technology. A "preprint" of this article was available on Steve Gilbert's AAHE listserv several months ago, and what follows is Dana Cartwright's comments on Geoghegan's observations.

Wow! 100% correct and on target and relevant. And what a challenge is implicit in his remarks. Getting the early faculty adopters and the campus computing organization hooked up wasn't easy, as I recall. But as Geoghegan makes clear, that was in some sense a marriage made in heaven. So the next steps are going to be horribly difficult.

For many institutions, one of the next steps is getting the central computing organization refocused so it is solving problems for faculty rather than playing with technology. The core challenge is a cultural one. In most computing organizations, it is the technical types who are at the top of the pecking order—and they like to tinker with technology. Give them a budget and some space and they will buy the newest and latest whiz-bang.

Such people (seemingly) delight in erecting poorly documented, hot-off-the-presses, unstable systems which aren't quite ready for the big-time. The reason many faculty can't use computing is that the computing they are being asked to use is a crock (unstable, poorly documented, constantly changing, poorly supported, doesn't run on the computers people own, works differently at different phases of the moon...). Most institutions of higher education would be much better off with stable technology that is a couple of years old, provided by people who appreciate computing technology as a means to an end—that end being teaching and research.

> *Changing an organization's culture is the single biggest challenge in management. What college or university has the guts (or time, or interest) to seriously shake up their computing organizations?*

How to make the change? Changing an organization's culture is *the* single biggest challenge in management. What college or university has the guts (or time, or interest) to seriously shake up their computing organizations? But refocusing the central computing organizations isn't going to happen just because we wish it to. And thus the alternative: the dwindling of importance of central computing support organizations. Indeed, the notion of *central* computing support often stands in the way of making computing more effective in instruction.

In the long run, higher education will not spend money on things that are unimportant to its central mission, especially when money is in short supply. The extra money we became used to in the 1980's is gone and not likely to return. So to the extent that central computing organizations have trouble shifting to true problem solving, they will find their funding drying up.

As long as playing with each new technological toy remains the focus of campus computing organizations, and "99% up-time" is a source of pride rather than an admission that the systems will fail several hours each week, the *only* faculty members who will get involved will be those kindred faculty spirits who also like to play with toys. If we assume that 5% to 15% of the faculty are the playing-around-with-tech-toys-is-fun-and-rewarding kind, then without a refocusing of computing support, effective faculty use of computing will remain in that low range.

I predict that many campuses will eventually find that their best strategy will be to chop the budgets of central IT to the bare bones, and use the money in other ways, such as funding computing staff who work directly within academic units. This will not guarantee that the mainstream faculty will be helped in appropriate ways, but it has a much better chance of working than having the staff off in some remote central location. So I look for the demise of things called "instructional technology support centers" and things of that ilk. What Geoghegan has made clear is some of the underlying pressures for this change. ■

Dana Cartwright was the Director of Academic Computing at Syracuse University until 1992, and is now with Designer Software, Inc.

Hot Issues 1994-95 ...

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advantaged by this extension, while others are put at an increasing disadvantage. Perhaps a computer should be in each room just as a phone is in each room on many college campuses."

The Internet. Yes, a wonderful, remarkable resource, but for some, there is a danger of going into overload—"Do we really want to give students access to all that's out on the Internet?" Librarians, in particular, are worried about how the mass of data available over the Internet will ever get organized. Usage, also, has increased dramatically, and will continue to do so, especially with tools such as Mosaic, which some campuses are formally incorporating into their Campus-Wide Information Systems (CWIS). One respondent mentioned that colleges need to start offering discipline-specific courses on Internet resources, such as "How Biologists Can Use the Internet."

The future of the Internet itself is of concern as well. Now that the public has discovered it and its commercial exploitation is getting underway, there is concern about its future affordability for education. Will it become a usage-charged service? Also, as one respondent said, "The explosion of hypermedia is threatening to choke the Internet just as it is beginning to deliver materials of interest to a wide audience."

Limited Financial Resources. This is quickly becoming, unfortunately, another Hall-of-Fame issue, with just about everyone we talked with mentioning it in the first few sentences. Not enough funding to meet the demand, no money for expanding services, too many users and not enough computers, shortages, shortages, shortages. How much longer can this continue without a complete breakdown in the institution's infrastructure? As one CIO put it, "When you have to make a decision between fixing a leaky roof and adding more computer resources, the choice seems clear to most decision makers. The problem is that most people don't understand that a bad information system can be every bit as serious—even more so—as a leaky roof; it's just that the consequences will show up later than puddles on the floor."

Limited Human Resources. The overwhelming concern here is not enough IT staff to do all that is expected by the campus community. "Doing more with less" has been with us now for several years, but this year it seems particularly agonizing in the way it is taking its toll on the staff.

One institution was even forced to institute a moratorium on summer vacations this year because of all the work that needed to be done to prepare for the new school year. And even the staff in those institutions without a formal moratorium find it difficult to find time to get away, even for brief periods. As one data processing manager said, "I feel as if I'm cramming for a final exam every day."

One director put it this way: "How will we keep up with growing expectations for expert and specialized help in an era when colleges and universities feel they need to reduce staff in general? Will we finally get into nasty intramural fights with other campus groups for resources? My campus library has me outstaffed 5-to-1, but we have counted them as friends and allies and not made an issue of the disparity in staffing levels—up till now."

The central problem is a continuous rise in demand for services (more equipment, more software, more networking) without a corresponding rise in the number of IT staff to provide the services. Many solutions are being tried: restructuring, consolidating administrative and academic computing, not trying to do "more with less" but rather "different with different." And all of this at the same time, for many institutions, that the need to retrain staff in new technologies has become critical. With so many changes, especially in areas such as fourth-generation languages, multimedia, network protocols, and so on, keeping the staff up to speed while coping with all of the demands on their time to provide services is pretty nearly impossible.

It used to be that colleges and universities were united mainly by common complaints about budget woes and parking problems. But these days the strongest links among academics are likely to be electronic. It's the age of on-line college admissions, of cyberspace conferences, of electronic journals, of computerized models of the human body, of remote classrooms linked by two-way video connections. Above all, it's the age of the Internet.

Millions of people worldwide—many of them academics—use the international network, which has developed into a cultural phenomenon replete with its own subcultures, etiquette, and jargon. What, you've never heard of flaming? You must be a newbie. ("Flaming" means attacking someone electronically; a "newbie" is a newcomer to the Net.)

There are subscriber groups for interests ranging from the Bromeliaceae family of plants to Barney the dinosaur. Users can conduct scholarly debates, hold learned-society meetings, release hostilities, call up images and sounds, or simply eavesdrop. "The Internet has become indispensable," says James E. Perley, the president of the American Association of University Professors.

The explosive growth of information technology in higher education is expected to continue in 1994-95. But along with new technology come new problems: Colleges are struggling to prevent computer viruses, software piracy, and data theft, and to provide fair copyright protections. They also have questions about the cost and value of the new advances.

Small colleges worry that they'll be left behind. Others want to make sure the new equipment is worth its price. As one college administrator puts it, "Are these toys for boys, or is this legitimate academic hardware?"

.... from *The Chronicle of Higher Education Almanac*
September 1, 1994

Renewal and Replacement of Equipment. It seems that everyone is accumulating great stores of "dinosaur" equipment. IBM XTs, 1988-vintage Macs, and VT-100s are only a few of the once-treasured pieces of equipment that now badly need to be replaced. Most of this hardware is simply no longer up to the job, given the sophisticated demands of today's software, and much of it is unreliable and not supportable. But since very few institutions have budgeted for replacements or upgrades, they stay far too long on desktops and in labs. "Yesterday the issue was a computer on every desk. Today that issue has evolved into demand for frequent upgrades and retrofits. Yesterday's word-processing-and-e-mail user now wants to use Mosaic and multimedia."

Library Issues. Many soul-searching issues of identity and mission are going on in campus libraries this year. What will be the consequences of a more student-driven era in campus computing? If computers and networks will give students direct access to more information than they have had in the past, what will be the effect on campus libraries as providers of information? Will libraries extend new services beyond their own walls? Will libraries become fully integrated with computer services departments?

The trends are certainly technological in nature. The nature of source material, document delivery, information storage and retrieval, full-text availability, and so on, are all combining to make the future of the library as we know it today very murky.

Administrative Computing. Again this year we are seeing a lot of activity with new systems. Huge numbers of colleges and universities are either looking for, or in the process of installing, a new administrative information system. The good news is that the systems are getting better and better. The bad news, of course, is that they represent a tremendous up-front outlay of resources to acquire, especially if hardware (including desktop devices) is needed as well. It's still easier for some institutions to justify in-house development for this reason, but, in fact, the costs for the two approaches may be closer than it appears at first glance.

The other big factor that we are hearing about in the build-or-buy decision is the timing—purchased systems generally are available to the end users faster than with in-house development efforts. That can mean a great deal for an institution that is in very bad shape with administrative systems at the moment.

The other big issue in administrative computing is making data accessible to non-technical end users (that's pretty much all of them, isn't it?). As one person put it, "Our system is a great data collection system. What it is not is a management information system; once the data is in there you can't get it back out in any meaningful way. Pre-formatted reports and the supposedly friendly tools for ad hoc reporting just don't go nearly far enough."

Client/Server. The question is how best to integrate the increasingly powerful desktop machines into the campus technology environment. Related to this is the issue of software; obviously, no institution can afford separate packages for separate machines. As in other areas, the pressure to utilize this technology well (and cost-effectively) is creating its own set of demands. One campus has

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BEST COPY AVAILABLE

Creators Admit to Unix and C Hoax

In an announcement that has stunned the computer industry, Ken Thompson, Dennis Ritchie, and Brian Kernighan have admitted that the Unix operating system and the C programming language created by them is an elaborate April Fools prank kept alive for over 20 years. Speaking at the recent UnixWorld Software Development Forum, Thompson revealed the following:

"In 1969, AT&T had just terminated their work with the GE/Honeywell/AT&T Multics project. Brian and I had just started working with an early release of Pascal from Professor Nichlaus Wirth's ETH labs in Switzerland and we were impressed with its elegant simplicity and power. Dennis had just finished reading *Bored of the Rings*, a hilarious National Lampoon parody of the great Tolkien *Lord of the Rings* trilogy. As a lark, we decided to do parodies of the Multics environment and Pascal.

Dennis and I were responsible for the operating environment. We looked at Multics and designed the new system to be as complex and cryptic as possible to maximize casual users' frustration levels, calling it Unix as a parody of Multics, as well as other more risqué allusions. Then Dennis and Brian worked on a truly warped version of Pascal, called "A." When we found others were actually trying to create real programs with A, we quickly added additional cryptic features and evolved into B, BCPL, and finally C. We stopped when we got a clean compile on the following syntax:

```
fr(;P("‘n"),R=;P(" | "))for(e=C;e=;P("_-
"+(*u++/8)%2))P(" | "+(*u/4)%2);
```

To think that modern programmers would try to use a language that allowed such a statement was beyond our comprehension! We actually thought of selling Unix and C to the Soviets (remember they were our enemies then) to set their computer science progress at least twenty years.

> *It has taken them 20 years to develop enough expertise to generate even marginally useful applications using this 1960's technological parody, but we are impressed with the tenacity (if not the common sense) of the general Unix and C programmer.*

Imagine our surprise when AT&T and other U.S. corporations actually began trying to really use Unix and C! It has taken them 20 years at this point to develop enough expertise to generate even marginally useful applications using this 1960's technological parody, but we certainly are impressed with the tenacity (if not the common sense) of the general Unix and C programmer. In any event, Brian, Dennis, and I have been working exclusively in Pascal on the Apple Macintosh for the past few years and feel really guilty about the chaos, confusion, and truly bad programming that has resulted from our silly prank so long ago."

Major Unix and C vendors and customers, including AT&T, Microsoft, Hewlett-Packard, GTE, NCR, and Digital have refused comment at this time. Borland International, a leading vendor of Pascal and C tools, including the popular Turbo Pascal, Turbo C, and Turbo C++, stated they had suspected this for a number of years and would continue to enhance their Pascal products and halt further efforts to develop C. An IBM representative broke into uncontrolled laughter and had to postpone a hastily convened news conference concerning the fate of the RS/6000, stating merely that, "VM will be available Real Soon Now." In a cryptic statement, Professor Wirth of the ETH Institute and father of the Pascal, Modula 2 and Oberon structured programming languages, merely stated that P.T. Barnum was correct after all.

In a related late-breaking story, usually reliable sources are stating that a similar confession may be forthcoming from William Gates concerning the MS-DOS and Windows operating environments. And IBM spokesmen have begun denying vehemently that the Virtual Machine (VM) is an internal prank gone awry.

Stay tuned for next month's issue of this newsletter in which we give details on how to reach Venus and Mars through the Internet (both planets are expected to have their own Gopher servers in the near future). ■

This article was reprinted with permission from the April Fools' Day edition of the newsletter produced by the Administrative Information Systems department at the Illinois Institute of Technology.

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responded to this by creating a task force on "ubiquitous desktop computing."

Miscellaneous. Several other issues were mentioned, but with less frequency than the ones above. Organization and structural changes came up a few times, with some institutions looking to bring together just administrative and academic computing, and others looking beyond that to the broader issues of information services in general for the campus, including the library, media services, campus electronics support, and so on.

Several institutions mentioned reengineering, TQM, and other similar efforts, and the role that the IT department was playing in those efforts. Other areas include partnerships with vendors, team formations (especially between IT staff and users), and general ways of collaborating to make things work better and more efficiently.

Multimedia was mentioned several times, especially as a possibility of being the item that will allow that giant leap forward into the classroom we have all been waiting for. Assessment has already come up as an issue as well. As one IT director said, "How can we who promote and support new learning technologies get meaningful assessments from these initiatives? I am thinking about the several in-class multimedia projects we have going on here. The students love them, but are they learning more or better?"

Training, both for the technical staff and the users, was mentioned by a few respondents, and in the contexts of both general "information literacy" and specific training in the hardware and software actually on campus. Training is seen to be one way to make sure that the institution's large investment in hardware and software is being fully used.

Telephones appear to be a concern of more IT directors this year. Responsibility for the on-campus switch, and even running the campus switchboard, seem to be part of the scene for more IT departments now. ■

Editor's note: Many readers contributed to this article, and we thank them all. Ones that made special contributions include Bernie Gleason at **Boston College**; Gene Spencer at **Bucknell University**; Dave Smallen at **Hamilton College**; Paul Stieman at the **University of Pittsburgh**; Bill Doemel at **Wabash College**; Bob Agnew at **Beaver College**; David Caldwell at **Wheaton College**; Melanie Bury at **The Fielding Institute**; and Tom Warger at **Bryn Mawr College**.

We want to especially thank David Cossey, Director of Computer Services at **Union College** for doing a great job of data gathering.

> **"Although the scientific, technological, and economic value of the information revolution has become increasingly apparent to the public, so far the equally significant contributions of the humanities and the arts to this revolution have remained less well known. But far from being the merely the documenters, commentators, and decorators of our existence, historians, humanities scholars, and artists are among the essential guardians of civilization and the human spirit.... The initial phases of the establishment of a national information infrastructure have largely focused on technology: equipment, interconnectivity, and access.... Now the focus must turn to content."**

"Report of the Working Group on Electronic Resources"
Humanities and Arts on the Information Highways: A Profile
September 1994

In Future Issues

- *The need to fill the IT leadership gap*
- *Principles of good data administration*
- *What educational leaders in our colleges and universities need to know about IT*

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EDUTECH RESPONDS

Q. We are in the midst of a campus-wide systems conversion for administrative computing, and have successfully installed the first major module (for the Finance area). The problem we're having is that the faculty hate it! They tell us the whole thing is much too complex, the screens are hard to deal with, the reports they get are so different from what they're used to that they can't use them at all. None of this is true, of course, but I am concerned that we have lost something important here. Can we get this back on track?

A. *Probably, but before you can, you have to be able to see the situation from the faculty's point of view. There's not going to be much progress if you continue to think that what they're telling you is "not true." In a very real sense, it's true if they say it is. One issue you need to tackle is damage control for this module, but probably more important, you need to get the faculty on board for the rest of the system installation, especially for the student information modules. Make sure you have one or two faculty members on your implementation teams, and make sure they are communicating with their colleagues about what's going on. Everyone hates surprises, especially when they have come to rely on a certain set of tools that suddenly goes away. As bad as a system may have been, there will always be those who like it better than the new one just because it was more familiar and comfortable. Don't ignore these issues; deal with them explicitly.*

Q. We need to stamp out what I call "niche computing." That is, there are too many people on this campus who are non-standard in one or more components of what's they're doing, and they're driving us crazy. Support is a nightmare and even sharing information is much more difficult than it should be.

A. *In general, we agree. Non-standard hardware and software is an affordability issue that translates into support, maintainability, and interoperability. However, there are two sides to the equation, and they should both be considered carefully, case-by-case. It is possible (even likely) that someone will have a "good enough" reason to not follow the standard; in these cases, it is cost-justifiable to introduce a non-standard component because of the resulting benefits.*

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THE EDUTECH REPORT

The Education Technology Newsletter for Faculty and Administrators

The Campus AIS: Keep or Replace?

Many institutions get themselves caught up in a hornet's nest when it comes to figuring out whether the current administrative information system (AIS) is adequate and can be modified to meet the needs of the future, or whether it should be replaced. This is certainly a legitimate issue to debate, and usually, valid arguments can be made for each option. But sometimes there are folks who will argue in favor of each side of the question with the wrong reasons. For instance, some of the architects of the original system may want to preserve it just because of their own investment in it; others may just fear change in general. On the other hand, some of the proponents of a new system may have unrealistic expectations about what a system can do. When these sorts of arguments are put forward, the discussion often deteriorates into a highly subjective and emotional one, with both "sides" getting further and further apart every time it's discussed.

One of the ways to get the discussion on a rational plane and to achieve a consensus on the right direction is to get back to basics. It should be the institution's needs that drive this decision, so it is necessary to look carefully at those needs, and then to see how well each option is likely to meet them in a reasonable amount of time and at a justifiable cost. This is not as onerous as it sounds, nor does it have to take months to do. What it does require is some objectivity combined with some knowledge of what the two choices entail, both in costs and benefits.

Four basic needs

The institution's needs can be expressed in a variety of ways, and can be as detailed as everyone has time for (and patience with). At this stage, however, stating the needs can be done quite simply—the institution really has only four basic needs for its AIS to fulfill. The

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"To prepare today's students for the world of 2025, we must begin working very hard, right now, to create on our campuses models of the information-webbed world they will face. Those liberal arts colleges that develop a strong information infrastructure will significantly enhance the skills of their students. To develop such an infrastructure, we must enlist information technology firms as partners. Why should these corporations be interested in working with [us]? Because we are ideal partners in demonstrating the utility of technology. We see information technology not simply as technology but as an information resource."

Richard A. Detweiler
President, Hartwick College
"The Information Age Goes
to College"
Technos
Fall 1994

NEWSBRIEFS

KENYON WORKBOOK AVAILABLE ON-LINE

Kenyon College has announced the on-line availability of its 1994 workbook for Kenyon's Summer Institute on Academic Information Resources. This document was created to guide faculty and student exploration of new and traditional information resources, and the 1993 edition won the Association of Computing Machinery (ACM) SIGUCCS (special interest group on user services) award for best training material. The 1994 edition has been updated and reorganized along pedagogical themes of information discovery, communication, and collaboration and the classroom experience.

The notebook is available in a variety of ways, including as browsable chapters and as a printable, formatted document. For more information, contact Scott E. Siddall, Project Director and Director of Academic Computing at Kenyon College, Gambier, Ohio 43022; siddall@kenyon.edu.

ON-LINE HIGHER EDUCATION

VOU (Virtual On-Line University) is the first accredited, liberal arts institution operating solely on the Internet. It was founded in April of this year to provide education to both traditional students and students who would otherwise have difficulty gaining access to a conventional college or university. According to the founders, VOU's goals are to provide low-cost, high-quality education; to offer distance education using interactive, interdisciplinary methods outside of, or supplementing, traditional learning paths; and to conduct research into on-line environments and applications in distance education and electronic delivery systems. The university is still in the process of recruiting faculty and organizing classes. For more information, contact William Painter, Executive Director, at (501) 327-0337; billp@ccl.uca.edu.

In February of this year, Thomas Edison State College in New Jersey released a new version of what it is calling the most complete higher education system in the world for adults. The system offers a broad range of services, including initial inquiry through application for admission, credit courses on-line, contact with academic advisors, and regular contact with college staff as students work toward their degrees. Any adult with a personal computer and a modem can connect to the network over telephone lines. For more information, contact the CALL Network Technical Center at the College, 101 West State Street, Trenton, New Jersey 08608; (609) 777-4140; modem line (609) 292-7200.

NO PROTECTION FOR COLLEGE BULLETIN BOARDS

College administrators everywhere are waiting for the final outcome of a Santa Rosa Community College case in which two female college students who claim to have been insulted on a male-only electronic bulletin board were awarded $15,000 each. The U.S. Department of Education's Office for Civil Rights has rejected claims by the College that the remarks were protected under the First Amendment, saying that the computer conference was not a public forum, but rather an "educational program."

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Can This Project Be Saved?

Scenario: *The computer center director at a small college, after just having chosen, and signed a contract to acquire, a new administrative system from Vendor X, suddenly leaves the institution, taking with him all of the institution's knowledge of broad project plans, internal resource requirements, schedules, and so on. The remaining staff is left to pick up the pieces with nothing in writing and no clear assignment of responsibility. Five separate user implementation teams have been set up, one for each of the major software modules, and each one of the teams is relying on the computer center staff to support their piece of the overall implementation. Not all of the users are sure why this system was chosen, or even if there should be a new system at all. There is a recently formed project Steering Committee, chaired by two members of the computer center staff.*

As might be predicted, chaos ensues. It happens several times that computer center staff members are scheduled to be in more than one training session at the same time. There is difficulty in setting up a test data base and the staff does not know how to get help from the vendor for this. No one is sure exactly what the school is responsible for and what the vendor is responsible for. One of the vendor consultants has to be replaced due to an attitude problem. Schedules have slipped and the implementation of certain modules are now outside of a logical sequence. Everyone is badly overworked and getting increasingly discouraged, still waiting for the first success. Can this project be saved?

It is unfortunate that the system selection happened the way it did. While the institution has probably chosen a very good software system, it was done in such a way that a real opportunity was lost to have users buy into the project at a very early stage. The past can't be changed; this is worth mentioning at this point only because it is important to recognize that a very understandable lack of commitment on the part of some users will need to be taken into account as the project progresses.

> *The computer center director at a small college, after just having chosen, and signed a contract to acquire, a new administrative system from Vendor X, suddenly leaves the institution, taking with him all of the institution's knowledge of broad project plans and internal resource requirements.*

The institution needs to acquire a project manager as soon as possible. This person should be placed somewhere in the user community, reporting as high up in the institution as possible. He or she should chair the Steering Committee, and be "in charge" of the whole project from beginning to end. If at all possible, the person should have both a technology project management and a higher education background. Schedules and budgets should be the first items on this person's agenda. Of all of the signs of effective project management, a detailed project plan with names and dates is the most visible and tangible. The lack of these plans represents a serious gap.

In trying to decide whether this should be a temporary or permanent position, it would be good to keep in mind that in addition to the project implementation, this person could also have a very important on-going role in helping end users take full advantage of the system in terms of their own rethinking of processes and uses of information.

The schedule for cutover dates should be redone so that it puts the modules back into a logical sequence, and so that it is realistic. It is also important to take advantage of the momentum that has built up—a new schedule does not have to mean that the institution is "starting over." It just means that the necessary adjustments are being made to give everyone some badly needed breathing room.

Finally, even before the new project manager comes on board, someone at the institution needs to have a Long Talk with the software vendor. A knowledgeable and experienced vendor, as this one is, could have forestalled a lot of the mess the project is in at the moment. One of the benefits of buying a package from an experienced vendor is to be able to depend on that experience to keep the institution from just these sorts of problems. The vendor should have anticipated clearly predictable problems and alerted the right people at the institution to them.

Yes, the project can be saved, but it will take a dedicated and unified effort to do so. ■

All Aboard the Information Super...Railway!

by Frank Klassen, Jr., American Council on Education

***Editor's note**: It's easy to forget that there are still many institutions not connected to the Internet, and many decision-makers at those institutions who are still wondering what all the fuss is about. This article is for the frustrated faculty member who said recently, "I went to an international conference last month, and everyone was exchanging e-mail addresses. The only two people who didn't have one were me and the guy from Lithuania. We have to get my president educated!"*

You read about the information superhighway in every journal, newspaper, and professional communication you receive. "It" does amazing things! "It" can help information leap tall buildings in a single bound. And "it" can deliver data faster than a speeding bullet.

"It," of course, is the Internet—and the first thing I would say about it (besides all of the above) is that it's probably misrepresented as a super *highway*. In my mind, at least, the Internet is better characterized as an information super *railway*. Explaining my position may help readers better understand what the Internet is and what it can (and cannot) help them do.

Like the railways of yesteryear, the Internet is an interconnected collection of independent entities, each responsible for laying and maintaining its own section of "track," which is available to all "trains." All of the entities have agreed to use the same gauge (width) of track and have agreed to the same signaling system, but they have left wide open the question of what kinds of trains will use the tracks.

One can think of the applications that run over the Internet as different types of trains. "File Transfer Protocol" (FTP) is like a freight train—it has an industrial look and feel to it and is used for the everyday transport of large and small files. "Gopher" is like a passenger train—a lot more comfortable for most people to use, it helps "riders" on the Internet get from one place to another with relative ease. Another application, "Mosaic," is like a luxury passenger train—it offers riders more amenities, scenic routes, and even movies (i.e., text, sound, graphic, and video capabilities).

> *The Internet, then, is a place where anyone's trains can use anyone else's tracks, and users can take advantage of the trains to trade and travel. And, like the railways, the Internet is a place wide open to both opportunity and danger.*

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Opportunities

The railways opened up new frontiers for the budding American nation. Likewise, the Internet has the potential to open up new modern frontiers of commerce, communication, education, and entertainment.

The Internet began as a way to make it easier for researchers in widely dispersed locales, and belonging to different organizations, to collaborate on and share research efforts. Its uses have grown to encompass many other valuable features: it can provide greater and wider access to information resources—the resources of the Library of Congress or those of MIT, for example, can be accessed anytime, from anywhere, by anybody on the Internet. As the railways expanded the reach of American/European culture and industrial technology to the western wilderness, so the Internet can expand the reach of education institutions (and their expert faculty) far beyond the boundaries of the campus. More passengers are able to ride, and they have a much broader choice of destinations and travel experiences.

The Internet can be used to deliver education to new segments of the population and can create new ways to deliver education, possibly forging a new and improved teaching methodology at the whistle stops of the super railway. At some campuses, electronic mail and "groupware" (software that allows cooperative interaction on a document or project) are being used to broaden academic discussion and interaction. With the Internet, student-to-student and student-to-instructor dialogue can occur beyond the physical and time constraints of the traditional classroom setting. In fact, the Internet can be used to broaden discussion and research well beyond the confines of any single campus or student body. Course content can be delivered anywhere the Internet goes, and not just lectures transferred to text, but a fully interactive learning experience including video, sound, animation, simulations, and both immediate and "extended" interaction between and among students and instructors.

Dangers

But there are real dangers inherent in this new super railway as well. Some arise from the people who use (or abuse) it. Modern day hackers are akin to Jesse James and his ilk—they take advantage of the system's easy access both to rob it of its riches and to cause general mischief.

Because the system is still so new, security is not yet well-defined. Moreover, due to the nature of the system, *real* security may never be possible, because while each independent entity worries about its own track, it has little involvement or interest in the tracks, trains, or even the passengers of the other entities. Without centralized railway police of some kind, users must provide for the security of themselves and their own baggage or cargo (or maybe just not carry or send anything of great value).

Unruly passengers also can endanger the Internet. Because passengers are able to convey any message, idea, or campaign, and because the tracks can take them almost anywhere in the world, a single passenger's message can have a huge, and almost instantaneous, impact on a nearly captive audience.

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There are also fears that as the large commercial high-tech firms begin to tap into the potential of the Internet, they could become like the robber barons of old, scheming to outdo one another, to exert their own control over more and more sections of the Internet's vast track, and, of course, to make larger profits from what most consider to be a service-oriented operation—all of this to the detriment of those who use the system for activities for which it was originally intended: education, work, commerce, and even play.

Another danger is that if the system is not adaptable to new technologies, capabilities, and/or challenges, its sheer size and the weight of the commerce it must support may derail the Internet. The railways came close to extinction when newer, more efficient methods of transportation were developed. The Internet must be able to accommodate the increasing demands of vast numbers of new passengers, as well as new kinds of cargo (such as real-time video and sound), or it surely will go the way of the steam locomotive.

The role of universities

How can universities help keep the information super railway running at capacity and on time, and servicing the people of our nation equitably?

As developers of the system, universities can continue doing what they have been doing ever since the beginning of the Internet—constantly coming up with innovative ways of using and improving it. Most of the best applications have been developed in university research labs (for example, Gopher was designed and developed at the University of Minnesota; Mosaic came from the University of Illinois).

Universities also can help by educating their Internet passengers as to the best ways to use the service and by providing guidelines for appropriate passenger behavior to serve as models for others. And as investors, universities can ensure that the tracks are well kept and improved to meet new demands.

Finally, universities can keep the communications and entertainment giants from becoming the robber barons by continuing to emphasize the importance of the Internet's role in education and research. ■

Frank Klassen is director of Information Resource Management at the American Council on Education. This article first appeared in the Summer 1994 issue of Education Record.

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The Campus AIS: Keep or Replace? ...

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first is that it be able to assist with the institution's day-to-day business operations. That is, it has to keep track of admissions prospects, help turn prospects into applicants, get applicants admitted, make sure both new and returning students get the right amount of financial aid, house them, register them for classes, grade them, move them along from semester to semester, graduate them, raise money from them once they're gone, and keep track of all of the financial and human resource activities that it takes to make that all happen.

Of course, there are as many variations on this as there are colleges and universities, but this is the basic set of administrative functions. The trouble that many institutions have is not in accounting for institution-specific variations, but in not taking into account how much may have changed at the institution itself since the current information system (likely the institution's first) was put into place.

For instance, the institution may have added many options to its original profile of the full-time, traditional student. Part-time students, evening and continuing education students, non-traditional degrees, variations in grading schemes, dual majors, a lot of transfer students, students studying off-campus, students taking independent study courses, students whose tuition is paid by third parties or by parents who live at two different addresses, and on and on, are all part of today's reality at many institutions. The institution's information system has to be able to accommodate these, and many other, variations without a gut-wrenching, labor-intensive effort every time they come along.

One thing we know for sure is that the amount of variation is only going to increase as time goes on, and the old, basic "rules" will apply to fewer and fewer cases. A typical institution today is increasingly trying to accommodate the needs of diverse individuals rather than a homogenous, easily categorized student body; its AIS has to be able to help the institution do that.

The second need is that the AIS has to provide information and processes that help make the institution as efficient as possible. For instance, the system should keep paperwork to a minimum, eliminate both redundant tasks and redundant data, and ensure that data going into the system is as accurate as possible.

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Again, one of the issues that an institution can lose sight of is the need for change, and to constantly make sure that the AIS is keeping up with the institution's ever-increasing need for efficiency. Financial aid letters that now require a counselor's name on them should come from a process that does not allow the counselor-name field to be blank, even if that was okay in the past. A student work-study employee should not have to get 13 W-2 forms this January just because she now works in 13 different departments at the institution at 13 different pay rates. This sort of situation just didn't exist five years ago, and what was once an efficient payroll system may no longer be.

The third AIS need is to provide excellent student service. Every institution today is on a quest to make its environment as "student-friendly" as possible, and while actually treating a student as a "customer" may be going a little too far for some, there is a widespread recognition that students will no longer put up with things such as standing in long registration lines—nor should they.

The institution's AIS needs to reflect this very supportive attitude toward students, so that, for instance, when a student needs to change his or her home address records, the records have to be changed in only one office for every other office on campus to find out about it. A student should receive only a single bill from the institution with all of the necessary charges (dining services, housing, bookstore, library fines, etc.) detailed on it. And speaking of billing, if the tuition bill doesn't reflect anticipated financial aid, watch out for some angry parents!

One of the biggest innovations in student service in the last few years is the use of ATM-like machines or kiosks for students to access their own academic or financial information. This, of course, requires both an underlying information system and a data architecture that can handle this kind of open access.

Fourth, and some would argue most important, the system needs to provide ways for non-technical people to make their own use of the system and of the information kept in the system. This includes both upper-level administrators who have a need for information for planning and decision-making, as well as sporadic users of the system who do not get the opportunity to learn all of the ins and outs of the system from everyday use.

The system needs to be easy to use, easy to tap into, and easy to navigate. That means lots of menus for those who need them, no cryptic codes, and no ways to go down unrecoverable blind alleys. It also means having data access and reporting tools which can be used by non-programmers, along with a data architecture that makes sense to ordinary people. Selection of data records and data elements, report writing, screen display, and downloading all have to be there, ready to use, without having to jump over large, imposing hurdles.

Making the comparisons

How does the institution's current system measure up? Does it do the full range of what's needed now and can it continue to be steadily modified for the future at a reasonable cost?

How likely is it that a new system can be found that meets all four of these needs and is still affordable? Is it possible to separate sales promises from actual performance?

The answers to both of these sets of questions can found relatively easily through some objective research. Once the research is done, it should be shared with the campus community in order to build consensus around a particular direction. On both sides of the issue, actual knowledge—not conjecture or speculation—is required. And it is best to keep in mind that neither solution is perfect; each one has costs and benefits.

As we all know, things change very quickly in information technology. The needs of the institution, as well as what is being offered in the marketplace, are undergoing rapid transformation. To make intelligent decisions, people at the institution have to stay very well-informed. Developing a full and accurate picture of the current situation and becoming educated about the options for the future, including each of their true costs and benefits, is the most effective way to make the best possible decision for the institution. ■

> **"Many who urge a more rapid proliferation of computer technologies in higher education also tend to believe and behave as though their blessings are without disadvantages; thus, they overlook the unintended consequences of otherwise useful technological changes.... 'What will a new technology *undo*?' is at least as important a question as 'What will the technology do?' Issues of equity, ethics, and privacy already have begun to surface within the higher education computer world, and many more such questions will arise. I think we ought to ask and answer these questions before we allow the inexorable acquisition of computer products to redefine our concept of progress."**

Blenda J. Wilson
"Technology and Higher Education: In Search of Progress
in Human Learning"
Educational Record
Summer 1994

In Future Issues

- *IT components: moving from optional to required*
- *The need to fill the IT leadership gap*
- *What educational leaders in our colleges and universities need to know about IT*

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EDUTECH RESPONDS

Q. Our computing situation is a mess. We just don't have enough money to do things the way they should be done, and, as a result, our faculty don't have enough computers, the students are using public labs that look like they're from the 1950's, and our administrative system is in complete disarray. The college is strapped financially, and is being to forced to choose between things like getting new computers or fixing leaky roofs. As the director of computer services, I find this increasingly untenable. Is there anything we can do?

A. *We have a few suggestions. First, it needs to be as clear to everyone else at the institution as it is to you that this situation is "a mess." That is, the lack of appropriate technology is not the institution's real problem; it is the lack of what can be done with better technology (and how much money it is costing the institution to be without it today) that's the real problem. These are things that can only be expressed by the end users, and their audience should be the institution's decision-makers. It so often happens that the lack of money is really a subsidiary issue to the lack of attention on IT by upper administration. If IT were seen as more important, it is possible that different institutional funding choices could and would be made. One way to foster this attention is to organize a high-level Information Technology Policy Committee. In addition, the decision-makers need to start becoming educated as quickly as possible about the trade-offs between leaky roofs and IT; just because IT looks as if it can be postponed, that may well be the wrong choice for the college's long-term interests.*

Q. We have a little money left over in our budget after all of this year's commitments are paid for, and, naturally, there is considerable debate about how to spend it. It isn't much, but we could get a few microcomputers with it at least. The funny thing is that our computer services director is urging us not to because of what he calls the "total cost of ownership." What is he talking about?

A. *This phrase is meant to convey that the cost of a micro goes well beyond the cost of the hardware acquisition. It is also software, network hook-ups, training, and support. All of these items should be included in your decision about what to use the money for.*

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THE EDUTECH REPORT

The Education Technology Newsletter for Faculty and Administrators

Campus Telecommunications: Easing Faculty Fears

by John W. Bardo, Bridgewater State College

Satellites, dark fiber, cable and microwave technologies all make it possible to transform the college environment and the teaching and learning process. Possible. But—so the story goes—faculty have been very slow to adopt these technologies and, as a result, colleges and universities are lagging far behind other organizations in realizing the benefits of the telecommunications age. "Faculty intransigence" is often seen as the primary impediment to fully implementing and realizing the value of technology. And indeed, studies have revealed that many faculty see telecommunications technologies as dehumanizing. But part of what is perceived as faculty resistance to telecommunications results from the technology itself not yet living up to its promise.

Legitimate questions abound about whether current telecommunications technology produces the types of learning that higher education is increasingly expected to provide. For example, many experts such as James Appleberry, the president of the American Association of State Colleges and Universities, have urged colleges to stress the development of oral and written communication skills, critical thinking, and collaborative problem solving in small groups. But much of technology-enabled distance education remains passive. The learner is an observer who may not even have an opportunity to ask questions of the presenter.

Other issues are organizational, social, and practical. It is doubtful that large numbers of faculty will move to adopt the new technologies until many of these problems are resolved. Fortunately, most of the problems can be overcome.

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"Colleges and universities are wiring their campuses for so-called interactive learning and the virtual classroom, and more teaching is accomplished through video displays and computer networks. There is nothing inherently wrong with [this]. But the alarming trend shows universities using computers as a direct substitute for faculty-student contact. Students are complaining that they seldom see a full professor. From Socrates to Richard Feynman, face-to-face dialogue with students has constituted the essence of a good education, something even the most sophisticated computer cannot match."

Langdon Winner
Rensselaer Polytechnic Institute
"The Virtually Educated"
Educom Review
September/October 1994

NEWSBRIEFS

ADAPTING INFORMATION TECHNOLOGY

Current attendees of the on-line workshop, "Adapt-IT: Adapting Information Technology & Computing," are using the Internet to find information about access to information for people with disabilities. Attended by academic administrators and advocates for those with disabilities in industry and business, participants have come from Germany, Spain, Thailand, Australia, Canada, and more than 25 U.S. states.

The workshop, first held in January of 1994 and run on a quarterly basis, is a collaborative effort between Norman Coombs, a history professor at the Rochester Institute of Technology (RIT) and chair of the Equal Access to Software and Information (EASI) project; Richard Banks, an adaptive technologist in the library at the University of Wisconsin-Stout; and RIT's Educational Technology Center. The workshop content includes reasons to adapt; legislative history; the lab environment; alternative input and output systems; computing as compensatory devices; and planning and funding.

The fee for the workshop is $125. For more information, contact Norman Coombs, nrcgsh@rit.edu.

GUIDE FOR ON-LINE RESEARCH

A new guide for finding on-line research, the *American Library Association Guide to Information Access*, was compiled by more than 50 library experts to inform users how to find the information they need. Resources identified by the guide include 3,000 print, electronic, and advisory resources, including encyclopedias, periodicals, organizations, CD-ROMs, and electronic bulletin boards.

The book covers detailed strategies for locating the right information, and contains hundreds of specialized resources. For more information, contact Random House, New York, NY (212) 751-2600.

NEW EDUCOM PROJECT FOR IMPROVING TEACHING

EDUCOM has announced the formation of a new project designed to enhance the teaching process through the use of technology. Entitled the National Learning Infrastructure Initiative (NLII), the purpose of the project is to demonstrate how information technology can be used both to improve instruction and to cut costs, and will involve colleges and universities, publishers, and high-tech companies.

Colleges and universities that are members of EDUCOM can join the project by paying a yearly fee of $5,000. Start-up members include the University of Iowa, the University of Maine, the University of Michigan, and the University of Pittsburgh, as well as IBM, Apple, and the State Higher Education Executive Officers organization. For more information, contact EDUCOM at (202) 872-4200; nlii@educom.edu.

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Sure, Fine, But How Are We Going to Pay For It?

You've developed a vision; you've set a direction; you've gotten all the right people to buy into the strategy. The whole thing makes complete sense, and everyone is behind you, even the president. But you can't make even the first move without funding. The college's expenditures for information technology (IT) have been too little for too long, and it just can't go on this way. Not if the college wants to be a viable academic participant in the twenty-first century. So the need is clearly there, well articulated and well justified. But the money is not. What to do?

The first thing that has to be done is to make the identification of funding and funding sources a formal project for someone at the institution. Too often, trying to figure out how to pay for campus technology is a scattered, *ad hoc* activity that no single individual is fully responsible for. As a result, efforts are often fragmented and not effective. Whether it is the responsibility of the institution's Chief Information Officer (CIO), the Chief Financial Officer (CFO), or perhaps someone in the Development office, funding efforts need to be centrally coordinated, well planned, and formally managed.

There are only two general sources of funding. The first comes from reallocating existing institutional funds, and the second is from acquiring new funding from one or more sources.

Reallocation

Reallocating the institution's resources is both easier and harder than acquiring new funds. It is easier in the sense that an identifiable pool of money already exists for the institution's purposes. It is harder, of course, because any increase for IT means a decrease somewhere else, and there are certainly not many administrators or faculty who are likely to just simply accept a decrease in their area. Especially with the financial difficulties that higher education in general has been experiencing the last several years, most colleges and universities have already had to accept diminished funding in some areas so that other areas could be better supported; financial aid, building maintenance, and faculty salaries are common examples. There just may not be any maneuvering room left for information technology.

> ***Depending on grant money to pay for infrastructure activities is a bit like depending on being named in a relative's will to pay your grocery bill—it may work once, but it is not a reliable source of on-going support.***

But this option should at least be thoroughly explored. To do it well, several things are necessary. First, the institution should be able to start with a clean slate each year. That is, for most institutions at least, it is not useful to simply assume that this year's allocation of funding among all of the various units should be the same for next year, and that the only money to be discussed is whatever increase will exist as a result of higher tuition, or more students, or whatever. The basic allocation assumptions should be examined each year to make sure they are fully in line with the institution's goals and objectives.

That leads to the second requirement, which is that the institution know what its goals and objectives are. This means having priorities that make sense, and understanding that the institution's priorities should be reflected in both attention and resources. Priorities also change from time to time, and while last year it may have been extremely important to improve the physical look of the campus by planting a lot of new flowers and trees, adding new roads and walkway curbs, acquiring new attractive and consistent signs, and so on, this year it may very well be more important to replace all of the computer equipment in the public labs. In fact, some campuses are so far behind where they should be in information technology that it may need to be a very high priority for several years in a row.

The third requirement is that for any reallocation in favor of IT to take place, there has to be a great deal of broad support for the change. The IT department needs to be seen as having spent money wisely and well up to now and there needs to be widespread belief that new IT expenditures will bring a great deal of benefit to the institution. This almost always means that it has to be not just the IT folks who are trying the make the case for IT funding; it has to be the users (and potential users) themselves, usually through a committee structure of some sort. The point is that this needs to be seen as something other than de-

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Technological Issues

During the past several years, it has become increasingly clear that telecommunications and computing are no longer separate technologies. Computers "speak" to one another over twisted-pair telephone lines. Data, voice, and video signals are digitized and transported over the same fiber-optic thread. Satellite signals carry live interactive conferences across oceans, permitting conferees not only to see and hear one another, but also to share the same computer data set.

Similarly, there is a blurring of the traditional line between telecommunications and cable television technologies. In the Virginia suburbs of Washington D.C., Bell Atlantic is experimenting with transmission of television programming across telephone lines. Likewise, several cable systems may soon offer telephone service via cable. This trend promises increasing access to information for individual consumers and decreasing segmentation of technology types.

While the potential of the new telecommunications technologies is strong, several significant problems have emerged. First, much of the technology—especially interactive distance technology—still falls into the category of "vaporware." Its great promise tends to evaporate in production. Consider Time-Warner's experiment with interactive cable television in the Orlando region of Florida. This technology is based on a computerized television control unit—much like a cable control box—that sits on top of a television set. But as promising as this technology may be, Time-Warner has pushed back the date for adding the first commercial customers, so it can make additional refinements of underlying system software and the set-top terminal.

A second technological issue involves the actual structure of programming. Most colleges that provide distance education rely on converted television studios for their productions. These studios usually have cameras trained on the instructor and the front of the room. Some more sophisticated studios also have one or more overhead cameras to record desktop experiments, and video may be interspersed in "lectures." But for the most part, the programs feature talking heads in a quasi-classroom environment; they attempt to reproduce a traditional classroom setting at a distance. Learning is still passive and, even with interactive distance links, question-and-answer sessions are cumbersome.

Another key issue for higher education administrators and faculty is which technology to buy into. Today, international telecommunications programming to Eastern Europe or most of Asia, for example, involves extensive investment in satellite transmission equipment. In the near future, the availability of international fiber and the ability to send full-motion video across the Internet will provide a lower-cost alternative at some sites. But determining which technology to invest in and finding the funds to do so are two of the most difficult decisions facing campuses. Several states have made investments in statewide networks. But even these states face "end user" problems involving interactivity and program production. For example, power and transmission failures can cut off a program in progress. Unless back-up staff are available to handle students' questions, either enrollment or the number of questions that can be asked must be limited.

Mass Marketing

Unfortunately, the experience of college faculty using telecommunications tends not to match the sales pitch for the products. Because the programs are "live," there is no way to judge quality in advance. Moreover, distance programs that are sold to educators are aimed at a general audience, with little regard for the specific goals of the instructor. And because the broadcast is scheduled by a producer, the program may not fit well within the context set out by the faculty member.

For these reasons, most uses of telecommunications programs (with the exception of courses specifically designed as "distance education") have been in the form of "add-ons" or enrichment programming. For example, Bridgewater State College, along with Woods Hole Oceanographic Institution, provide the Southeastern Massachusetts home of the Jason Project, in which school children explore topics ranging from whale behavior to tropical reef habitats as seen and relayed by the robot submersible named *Jason*. These kinds of programs are additions to the curriculum, rather than replacements. Why? Because the programs are of short duration; they are not specifically aimed at any particular course; they are not necessarily available at a time when they would be most useful; and there is normally very little pre-training offered by the vendors of telecommunications programming, public or private, to ensure

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that even interested faculty members understand how to use the programs.

College professors cherish their academic freedom; they pride themselves on individual initiative and the ability to think, reason, and teach independently. Yet most telecommunications productions have been developed and marketed to faculty as if they were a monolithic group. Until the technology becomes more interactive and individualized, there is no reason to believe faculty will move *en masse* to embrace it.

Training Faculty

Faculty also need training if they are to use the technologies effectively. Faculty, for the most part, have had education and training programs in graduate school through which they developed norms, values, and beliefs regarding teaching. Yet, we expect them to go in front of the camera or to create programming appropriate for distance education with little or no training.

It's a situation where higher education can take a lesson from textbooks on marketing. When a new product is introduced, the manufacturer will often make samples available. Within any group of people, a few risk-takers will give the new product a try. In marketing parlance, these are the "early adopters." Based on their experience, others who are less adventuresome will try it, and eventually a broad-based market will develop. Why should telecommunications be any different? If we want faculty to warm up to the technology, we need to identify the early adopters and provide them with access to technology, training, and time for experimentation.

We know that active learning is much better than passive learning for most students. The combination of telecommunications and computing holds tremendous promise to foster cooperative active learning, but not if it attempts to reproduce the old classroom at a distance. We need to know the relationship between specific forms of telecommunications and learning. What techniques are effective for which learners and under what circumstances? Are certain concepts, approaches, or theories more readily taught through telecommunications?

Adopting Technologies

If we expect faculty at colleges and universities to adopt and adapt to the new technologies, certain critical issues must be addressed. Higher education institutions and technology vendors must:

Provide training. No faculty member can be expected to adopt new modes of educational service delivery without training and assistance.

Show evidence that the technology works. Faculty must be shown real evidence that the technology helps them achieve their teaching and research goals. Unfortunately, the literature on the uses of technologies in teaching offers little reassurance. One 1993 article on the uses of telecommunications in teacher education cited as benefits: 1) the students' experiences with access to "large scale" conferencing systems; 2) exposure to a wide variety of topics; and 3) "students communicated in a professional and scholarly way with students and faculty of other universities." These outcomes might well have been achieved in a conference call at much less expense.

Provide social and organizational support. At Bridgewater, adapting to technology was voluntary. Faculty members were able to find their own ways to applications of technologies that were appropriate to their disciplines. Faculty members now have begun to ask pertinent questions about intellectual property rights, workloads, and other issues related to the new technologies. The key to these developments has been peer support and training provided by the college.

Customize the product. Producers and distributors of technologies must develop their products in ways that will serve the individual goals of faculty members. The more a product can be individualized, the more likely faculty will find a use for it in their teaching.

Establish partnerships and on-site testing. The cost of these technologies, while dropping in unit price, is still high. If the vendors and institutions are to realize a sound return on their investment, vendors must become partners in the development and delivery of programming. Such collaboration receives plenty of lip service, but words must be translated into long-term, broadly based partnerships. In fact, businesses may need to place personnel on campuses to ensure that programs are effective and educationally useful. It is in the long-range interest of telecommunications firms and other businesses to ensure that graduates are able to function in the highly technological, competitive environment that will confront businesses in the next 20 years.

College and university faculty may be slow to change, but they are not generally opposed to change. Faculty will implement telecommunications technologies only if they get the organizational support and development they need to do it effectively. ■

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partmental empire building; the decision makers need to understand and believe that this goes way beyond the technologists just wanting some new toys to play with. Broad support from many different quarters all over campus will clearly increase the chances that the hard decision to reallocate funds can actually be made.

The final requirement is that the decision makers, the ones who actually have the authority to make changes in the way the institution spends its money, need to be aware of what's really important to the institution in both the short and long term. We all fall into the trap from time to time of paying attention to the urgent rather than to the important, and there are things that, to the technologically uneducated or unaware person, can seem to be eligible candidates for deferral simply because there is no immediate, visible crisis. How many institutions have put off replacing their administrative information systems because "we keep registering students and paying our employees"? Then, all of a sudden, a key computer center employee leaves (the only one who knows the precise sequence for the 37 batch jobs that need to run every night during registration), or the support staff in the Registrar's Office absolutely refuses to go through another registration period sitting at windows in front of lines of 50 or 60 impatient students, using dumb terminals that give them 3-minute response time. Deferring on funding in one area in favor of another needs to be done with full knowledge and understanding of what risk the institution incurs with each decision.

New Funding

Sources of additional money fall into three categories: the government, companies, and individuals. The methods for acquiring money also fall into three categories: outright donation, borrowing, and selling goods and/or services. The sources and the methods are somewhat related in that each source usually has its own method associated with it, so that an institution would normally expect to get grants from the government but would have to expect to sell something of value to individuals in order to acquire new money.

Government and foundation money is not as available as it used to be, but neither has it dried up completely. The Commerce Department, for instance, recently awarded $24 million in grants to nonprofit organizations and local governments working with colleges and universities on networking initiatives. One such recipient was Loyola University of New Orleans for a project to show how video teleconferencing and electronic mail can extend university services across the state of Louisiana. The National Science Foundation has administered for several years a grant program to help colleges and universities become connected to the Internet. Another common source is Title III from the Department of Education. Title III is a program for strengthening institutions generally, but it is also amenable to supporting technology initiatives if a strong link can be made between improvements in technology and a strengthened institution.

> *Deferring on funding in one area in favor of another needs to be done with full knowledge and understanding of what risk the institution incurs with each decision.*

Working with private companies can involve a variety of relationships, from actual partnerships in which there is more or less a peer relationship with both participants standing to gain (for instance, a joint software or hardware development project that would lead to a product marketed commercially), to a mutually beneficial arrangement by which the institution might buy something from a vendor (usually at a volume discount) and then resell it at a higher price to someone else (but at a lower price than the person could otherwise get), to outright discounts on products and services that the company sees to be in its best interests for either philanthropic or business reasons. A good example of the latter is AT&T's plan to donate 35 multimedia labs this year to colleges and universities all over the world through its Higher Education Technology Partnership Program. Most high tech companies (both hardware and software), and certainly all of the big ones, have similar programs. The best place to start in exploring the potential of these relationships is with the institution's current vendors, especially the technology companies.

A very obvious source of new money from individuals is the students. One of the most common strategies for colleges and universities to fund technology today is through the creation of a student fee. The new fee is not always formally identified as such, and there are various pros and cons for keeping it separate from other student fees and from tuition itself. But when it is created these days, it almost always applies to all students, regardless of the student's actual use of the institution's technology facilities and services. In other words, technology is being considered here more as an institutional resource similar to the library than as a tool for use only by certain students (such as a chemistry lab). This fee is not only a new, and potentially substantial, source of revenue, it is also on-going from year to year. It also has a tremendous advantage over grant money in that it is totally under the institution's control.

An institution can also sell technology-related products and services to students, such as computers, computer supplies, computer repair services, long-distance telephone service, voice mailboxes, cable TV, and so on. There needs to be some consideration of the risk of generating "unrelated business income," but on the whole, this strategy tends to work to everyone's advantage in that the student gets these things at a reduced rate and the institution makes money at the same time that it is able to offer a higher level of student service.

Each of these strategies for new money can be used by itself or in combination with others, and each has its pros and cons. A major drawback to grant funding is that it is short-term and can make the institution vulnerable once the funding is no longer there; depending on this kind of money for infrastructure activities is a bit like depending on being named in a relative's will to pay your grocery bill—it may work once, but it is not a reliable source of on-going support. And while grant money does not have to be repaid, it also often requires that the institution match the amount given out of its own funds. Relationships with vendors can be very beneficial but can also turn into sweetheart deals that work to the institution's detriment in the long term. And trying to get more money from students (for any reason) can have a serious backlash, including one as severe as a decline in enrollment.

Leveraging

Whether money for IT is reallocated from existing funds or newly generated, the institution will want to make the best use of it possible. One way that increasing numbers of institutions are doing that is through leasing (especially for hardware, but for other things as well). Even though leasing means higher costs in the long run than outright purchase, it can make a great deal of sense both in providing flexibility for changes and upgrades, and in lessening the shock to a single year's budget.

In terms of borrowing, an increasingly popular strategy is to append technology improvements on other projects for which money is being borrowed. For instance, the extensive renovation of a campus building could very well be used as an opportunity to wire the building, install an electronic classroom, or improve a public lab facility housed in the building.

None of this is easy. Will the benefits be worth it? That is easy—the benefits not only will be worth the investment, the potential is so great that it is literally unimaginable at this point. ■

> **"Libraries can and should be the base camps for the pursuit of truth and for the discovery of the new truths we will need to be making in all kinds of ways during the information age. Multimedia digital materials can provide both an educational hook to attract people into libraries and a line of self-generated questioning that pulls people back into books rather than away from them, as television generally does."**

James H. Billington
Librarian of Congress
"Electronic Content and Civilization's Discontent"
Educom Review
September/October 1994

In Future Issues

- *Today's IT organizational issues and the emerging strategies for dealing with them*
- *Administrative information systems for the year 2000*
- *Technology-enhanced distance education in small, liberal arts schools?*

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EDUTECH RESPONDS

Q. Mostly just because of tradition, our spending on hardware and software is decentralized for administrative offices and centralized for the faculty. In other words, a faculty member has to go through the computer services department to get a new computer and an administrator does not. Apart from issues of "fairness," does it make sense to continue this? If not, which way is right?

A. *Technology is still expensive and still rapidly changing. As long as that remains the case, spending for technology needs to be part of the institution's overall information technology strategy. Whether the funding comes out of a single budget or many budgets is not the real issue; it is whether each spending choice is the right one in terms of it being in the institution's best interests overall. If your institution can be assured that all information technology spending choices will be consistent with its larger goals, then the money can be in many budgets; if, however, the method of control and assurance is at the budget level, then spending needs to be centralized. Whichever way it is, it should be the same for faculty and administrators.*

Q. Only a short while ago, it looked as if the Chief Information Officer (CIO) position was going to report to the president, regardless of institution type or size. Now it looks as if that trend has disappeared, and in the institutions that have a CIO position at all, the position reports to one of the vice presidents or to the provost. What accounts for this change?

A. *The idea of reporting to the president has not disappeared. It may appear that way because it is still the case that for many colleges and universities, having a CIO means creating a new position, something generally easier to do at a lower (and somewhat less visible) level. However, there are many institutions that do have the CIO report directly to the president, and there is emerging evidence that these are, in fact, the institutions that are using IT most effectively. It is true, however, that this is still not a "comfortable" arrangement for many presidents; until CIOs in general become better politicians, negotiators, and empathetic listeners, the case will need to be repeatedly made for reporting to the top, rather than having it be simply obvious to everyone that this is where it belongs.*

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THE EDUTECH REPORT

The Education Technology Newsletter for Faculty and Administrators

Renting Expertise: A Small College's Solution

by Lawrence W. Mazzeno, Ursuline College

Finding yourself on a campus that is sorely deficient in technological resources is nothing new for those of us who work at small colleges. Heavily dependent on tuition for the bulk of our budget, we seldom find the spare change (normally six figures) to introduce the kinds of technology that will make us truly competitive with more affluent institutions—or, of even greater significance, make it possible for us to prepare our students for a world where technological literacy is no longer a luxury. Few small colleges have well-staffed computer services departments with enough expert time to examine campus needs and develop comprehensive solutions; the two or three people on staff spend most of their time putting out fires! The rest of the college community typically has little expertise in technology— especially outside the narrow range of their specific academic disciplines.

Compounding the problem for administrators is the deluge of information we receive every day from people who want to sell us "systems" that will do everything we need—and much we never thought of besides. Of course, most of these cost more than the institution has to cover its monthly payroll (some run up to the cost of the yearly payroll), so the dilemma for small-college administrators is this: How does one determine what is really needed, and then how does one pay the bill?

We at Ursuline recognized the problem four or five years ago, but our first attempt to improve our circumstances was moderately disastrous. We appointed someone in-house to do a needs assessment and to deal with vendors who might provide realistic solutions. As it turned out,

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"In the near future, hyperlearning will be the core process of nearly all business, work, and home life. And that process has nothing to do with schooling, except to make it at best useless and at worst intolerable. But education, as an industry and institution, is not just going to fade away or be reformed into the 'classroom of tomorrow.' It's going to collapse suddenly and swiftly—here today and gone tomorrow—like the Soviet Union, or, for that matter, the World Series and Tom Foley."

Lewis J. Perelman
Seattle Times
November 27, 1994

N E W S B R I E F S

PROFESSIONAL DEVELOPMENT OPPORTUNITIES FROM CAUSE

According to its mission statement, CAUSE, the association for managing and using information resources in higher education, believes that "people are the key to fulfilling the potential of the information resource transformation occurring on our campuses...." As a result, CAUSE has put together for 1995 an array of development opportunities for higher education information technology professionals. These include two five-day summer institutes (one for directors and one for managers); a series of regional conferences with the theme "networked information access and delivery: an update for computing professionals and librarians"; an annual conference next November in New Orleans with the theme "realizing the potential of information resources: information, technology, and services"; pre-conference half-day and full-day seminars on specific IT topics and issues; and several co-sponsored conferences, institutes, and workshops throughout the year.

For more information on any of these opportunities, contact CAUSE at 4840 Pearl East Circle, Suite 302E, Boulder, Colorado 80301; (303) 939-0315; info@cause.colorado.edu.

NATIONAL EDUCATIONAL COMPUTING CONFERENCE

This year's National Educational Computing Conference (NECC) will be held in Baltimore, Maryland on June 17–19, and is being hosted by Towson State University. Sponsored by the National Educational Computing Association, the conference will have as its theme "Emerging Technologies and Lifelong Learning." Conference organizers say that with over 5,000 attendees expected, the gathering in Baltimore is "for inspiration and contemplation, to look and to think, to talk and to listen." There will be exhibits featuring the latest in educational technology, hundreds of papers, classroom demonstrations, projects, posters and panel discussions.

For more information, contact the NECC '95 Office, Towson State University, Baltimore, Maryland 21204; (410) 830-2773; necc95@toe.towson.edu.

CALL FOR ASCUE PAPERS

The Association of Small Computer Users in Education (ASCUE) is requesting proposals for presentations at its 28th annual summer conference. Presentations should focus on areas of administrative and academic computing that would be of special interest to small colleges, such as campus-wide information systems, user training and support, new teaching methodologies, total quality management, public access to the Internet, hardware and software obsolescence, approaches to distance learning, and strategic planning for the information superhighway.

Proposals are due by January 16, 1995. For more information, contact Paul Tabor, 1995 ASCUE Program Chair, Biology Department, Clarke College, 1550 Clarke Drive, Dubuque, Iowa 52001; (319) 588-6526; ptabor@keller.clarke.edu.

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Higher Ed IT Honors Its Own

One of the outstanding features of the annual CAUSE conference (held this year in Orlando in late November) is the awards program. Over the years, the award categories have changed somewhat, and the criteria has been modified and enhanced, but the consistent theme throughout is that certain of us are doing this job excellently well, and should be formally recognized for doing so.

This year's winner of the *ELITE* Award for Exemplary Leadership and Information Technology Excellence was Robert Heterick, president of EDUCOM. Not only was this obviously well deserved for Bob as an individual, but it represents yet another judicious tie-in between the CAUSE and EDUCOM organizations. Bob was cited by CAUSE's recognition committee for the "range and significance of his contributions, because of his relentless pursuit of his vision of the future, and because of his dedication to the work we do." What this citation leaves out, of course (but what everyone who knows Bob recognizes), is his sense of humor, his warmth, and his fundamental savvy, especially in furthering the higher education IT agenda.

In addition to Bob having worked for thirty years at Virginia Tech (in various capacities, most recently as vice president for information systems), he is also a former CAUSE Board Chair. In receiving this award, Bob joins the pantheon of IT superstars who have been similarly honored by CAUSE over the years: Tom West of California State University, Brian Hawkins of Brown University, Bernie Gleason of Boston College, and Al LeDuc of Miami-Dade Community College.

What this really means for the rest of us is that there are role models, that there are outstanding examples of personality types and behavior patterns that lead to success in this field. How can I, as an IT professional, be successful? By acquiring or developing similar characteristics to this *ELITE* group: by having a vision of the role and potential of higher education information technology, by promoting that vision through all forms of communication, by working with others on my campus to build teams and coalitions, and perhaps most importantly, by actually delivering on the promise.

Another award given by CAUSE each year is for the best contribution to their quarterly magazine, *CAUSE/EFFECT*. This year it was won by Gerald Bernbom and Dennis Cromwell, both of Indiana University, for their article, "Data Architecture in an Open Systems Environment." The article describes the conceptual basis for a structured data architecture, and its integration with the deployment of open systems technology at Indiana University. The key strategic initiatives which brought these efforts together are discussed: commitment to improved data access, migration to relational database technology, deployment of a high-speed, multi-protocol network, and orientation to workstation-centered computing. The article appeared in the Winter 1993 issue.

Yes, the article was very interesting and timely. But it was also much more than that—it was well-written. Again, these authors, and all of the authors similarly honored over the years, are serving as vital role models. It's not enough to just know the technical stuff; in order to be excellent, an IT professional has to supplement that knowledge with the ability to communicate in understandable, interesting terms. The other CAUSE award, this one for excellence in campus networking, was won this year by the University of Delaware. According to the selection committee, the University of Delaware has "implemented a network strategy that has successfully embedded information resources into the campus culture. Its plan clearly supports the mission of the University, and they have used the plan to help successfully reengineer University processes and procedures."

And to add to its already outstanding awards program, CAUSE just announced the introduction of three new awards, these to honor "Best Practices in Higher Education Information Resources." The first is in Applications, for the development and implementation of an innovative application of information technology (excluding courseware) that furthers the goals of the institution. The second is in Service, for the development and implementation of an exceptional approach to providing information services to the college or university community. The third is in Professional Development, for the development and implementation of an exemplary program to provide for professional development of the information resources staff.

The corporate sponsors of the awards, Systems & Computer Technology and Novell, should be congratulated for their participation in this important event. They don't choose the winners—that's up to peer committees—but they do sponsor the awards, including giving stipends to the winners. For more information about CAUSE and about any of these award programs, contact them at 4840 Pearl East Circle, Suite 302E, Boulder, Colorado 80301; (303) 939-0315; info@cause.colorado.edu. ■

Renting Expertise: A Small College's Solution ...

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the person we appointed was simply not sufficiently conversant in the specialized environment of a college campus (who can know everything, anyway?), nor had we come to any real agreement about our current and future requirements. As a result, our in-house "expert" drafted what he thought was a good strategy, sent it out to a number of vendors, and received back six "plans" with costs ranging from under $500,000 to over $2 million.

A Different Approach

Clearly something was wrong. When I was asked by the President to take over executive responsibility for computerization on campus, I knew we needed to use a different approach. Consequently, I met with our Director of Computer Services to develop a strategy which would permit us to (a) identify the broad areas in which technology might be of benefit to us, (b) develop a list of hardware, software, peripheral equipment, and licenses to networks or shared data systems needed to meet those broad needs, and (c) construct an accurate budget for acquiring those items.

One thing we knew right away: we had neither the time nor the expertise to do the work ourselves. So, with the blessing of the Board of Trustees, we developed a Request For Proposals (RFP) to find a consultant who would be willing to work with us to create a plan to meet our special needs.

Let me say that, while I do not believe any campus has unique needs, the configuration of specific systems may well be unique for each college. Therefore, when we drafted our RFP to send out to potential bidders, we made it clear that we expected the consultant to develop a plan *for us*. Frankly, I'm glad we did that, for—predictably—at least one bidder sent us a thick, preprinted document which spoke in glowing generalities about "the campus of the future"—but it had precious little relevance to Ursuline College. We quickly set aside this "McPlan" (as I like to call this technologized equivalent of fast-food service) and agreed to bring in a local consultant who seemed to want to do something to help us, as a unique institution. Fortunately, it turns out that we made the right decision.

> *Few small colleges have computer services departments with enough expert time to examine campus needs and develop comprehensive solutions; the two or three people on staff spend most of their time putting out fires!*

What seemed particularly good for us at Ursuline was the methodology employed by the consultant in determining our needs; his approach was just right for our environment. Unlike others who had presented proposals in the first round, the new consultant came to campus regularly for over a month to speak with key players among the college community. He had one-on-one sessions with over fifty members of the administration, faculty, and staff.

Predictably, he talked to the President, Vice Presidents, Deans, and computer services specialists. But he also spoke to individual faculty in a wide variety of disciplines, and had conversations with the director of residence life, the director of academic support services, the bookstore manager, the director of office services, and a number of secretaries and administrative assistants who have daily contact with the hardware and software presently available, and who would be most affected by any changes or improvements.

In his conversations, he listened more than he talked, and he allowed interviewees to identify technology in their own terms. As a result, when he finished this part of the task, he had a good sense of what people at Ursuline knew about technology and what they felt would help them do their jobs more efficiently—including computers, networks, and audiovisual systems. No matter what someone mentioned, the consultant took exhaustive notes; these notes would eventually be transformed into a hard-copy document that formed the basis for the next step in the process.

Only when he had completed this exhaustive interview process did the consultant prepare a systems design. Fortunately for us, the design included much of what we already have—some of it to be upgraded as funds become available—to minimize the cost of trans-

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Laurence Mazzeno is the vice president for academic affairs at Ursuline College in Ohio.

forming the campus from one on which some computers now reside to one which relies on state-of-the-art technology both for instruction and for delivery of services to students.

We are now in the process of buying new equipment with existing funds, upgrading our present systems to meet the needs of our plan, and seeking outside funding to supplement our efforts. Because we have a coherent plan and a clear sense of what we need to fulfill our goals, we have had great success in talking to potential funders.

A second benefit has been that our campus community feels good about what we are doing. With all of the involvement generated by this process, there is little second-guessing of the computer services department, who in the past may have been considered an elitist group of compu-nerds getting all the toys they wanted but nothing the faculty and staff could really use.

Furthermore, the consultant has remained with us on retainer, providing modifications to our plan as required and offering solutions to those knotty problems that surface only when you are actually in the middle of putting together a system. The campus community has come to think of the consultant as "one of us," and they are not at all reluctant to speak frankly with him about problems or to seek his advice on new projects.

Lessons Learned

Our experience suggests the following "lessons" for small colleges.

First, it is impossible for a small college to get all it needs in the way of technology at one time without considerable outside support. Our consultant's report made it clear that we would indeed need to spend hundreds of thousands of dollars to network the campus, make technology available in all classrooms and residence halls, and provide the systems we need for efficient service delivery to students. The experience forced us to increase our efforts to seek outside funding.

> *One benefit has been that our campus community feels good about what we are doing. With all of the involvement generated by this process, there is little second-guessing of the computer services department.*

Second, we learned that, while no one on campus had a clear idea of what the whole system would look like, everyone was able to contribute something to describing the individual parts in ways no single in-house "guru" could have done. The conventional wisdom that wide involvement allows many good ideas to surface certainly proved true in our case.

Involving everyone both in drafting the general statements in the RFP and in stating requirements for their individual departments and programs has given them a strong sense of ownership in the plan. Having a clear set of objectives articulated in the RFP also made it easy for us to examine proposals against our key needs and therefore, made selection of the consultant much easier.

A third point is that we have become convinced that "staying local" when searching for a consultant has proven to be very beneficial in several ways. Most obviously, the consultant was able to schedule visits over a long period, thereby accommodating the dozens of people he wished to interview. Had we hired an out-of-town firm, much business may have been done over the telephone or crammed into two or three days when consultants were able to come into town for a visit.

I believe, too, that our consultant was able to include more people in the data collection process because he had an office within a short drive of the campus. Finally, because he is close by, we were able to retain him beyond the term of the original consulting contract; he is helping us put into place the system he designed, and can stop by to make on-site inspections, reviews, and advisory visits with minimal difficulty.

Administrators at many small colleges wonder if they can afford an outside consultant to help them identify and address their information technology needs. While I can't say that doing so will always guarantee success in the process, we at Ursuline are convinced that by "renting expertise," we have saved both money and time—scarce commodities on a campus where service to students both in the classroom and outside it are given the highest priorities. ■

The National Learning Infrastructure Initiative

Call to Participate by the Founding Members

There is widespread recognition that American higher education needs re-structuring in order to contain or reduce rising costs, to increase access, and to promote significant improvements in the quality of student learning. To achieve these restructuring goals, reform efforts must include the creation of new kinds of learning environments that harness the power of information technology.

The National Information Infrastructure (NII), proposed by the Clinton-Gore administration, creates a major opportunity and a major challenge for the higher education community. The NII, a network of networks, represents a powerful new linkage of computer, video and telecommunications technologies, potentially reaching every home, school and workplace in the U.S. and in the world. Effective ways to use the NII for teaching and learning need to be planned and developed. The realization of a rich teaching and learning environment via the NII—one that meets the goals of improved quality, cost containment and increased access—will require a major collaborative effort by those with the knowledge, skills and resources to address the technical, operational, economic and cultural barriers to its creation. To address this challenge, we have formed a coalition. We are seeking other institutions and organizations to join us.

Background

For some time now, campus, statewide and national telecommunications networks have provided increased capacity and capabilities. As we move from today's Internet and multiple video-based networks to the proposed NII, networks will continue to grow and increasingly to interconnect. We have also seen the emergence of a variety of technology-mediated learning environments including stand-alone computer-assisted instruction (CAI) applications created by both universities (individuals and teams of faculty) and commercial enterprises (publishers and technology companies); networked communication and information resources providing access to library and other learning materials; experimentation with teaching and learning via new modes of communication (e.g., computer conferencing); and distance learning developed by both individual institutions and consortial or statewide efforts, offered primarily, though not exclusively, via television.

> *We want to create a learner-centered environment. Our focus is on the learner, and we want to create a reengineered environment in which the learner can thrive.*

While these new technology-mediated learning environments provide some alternatives to traditional classrooms on campus, most either "bolt on" to the traditional classroom structure (adding cost) or use technology to replicate and extend it (sacrificing quality). Furthermore, these efforts have largely developed independently of one another and without the benefit of synergistic collaboration. Most remain marginal to the mainstream teaching and learning activities on our campuses. In addition, little effort has been directed at cost/benefit analyses of the most effective forms of technology-mediated learning, analyses that can guide future investments by government, institutions and corporations.

A National Learning Infrastructure

We have chosen the words, National Learning Infrastructure, to express our collective vision of a strategic response to this set of challenges and opportunities. Each of these words adds meaning to what we are trying to accomplish.

Our effort is *national* in scope. We seek systemic change for American higher education. While the benefits of change may be local or particular, the effort required to realize those benefits must be collaborative. We want to create a *learner*-centered environment. Our focus is on the learner, and we want to create a reengineered environment in which the learner can thrive. Teachers are an essential part of that environment, and we seek to enable faculty to navigate the transition to these new environments. We need an *infrastructure* to facilitate technology-mediated learning. The NII is an important part of this infrastructure, but it is not enough. We need new relationships and arrangements—among institutions, among institutions and corporations, among institutions, corporations and public policy makers—to facilitate the systematic availability of learning products and processes.

Mission

The mission of the NLII is to create new collegiate learning environments that harness the power of information technology to improve the quality of teaching and learning, contain or reduce rising costs, and provide greater access to American higher education. The NLII pursues this mission by engaging in a national collaborative effort by those with the knowledge, skills and resources needed to address the technical, operational, economic and cultural barriers to the creation of a National Learning Infrastructure.

The NLII accomplishes this effort by undertaking, on its own and in partnership with others, activities that create, evaluate and promote learning products and processes leading to the establishment of high quality, cost effective, accessible learning environments and greater learning productivity. The NLII directs the combined intellectual, technological, professional and financial resources of its members according to a shared vision of how information technology can transform the collegiate teaching and learning environment to improve quality, contain costs and increase access.

Goals and Objectives

Our first goal is to inspire, by promulgating a vision of a National Learning Infrastructure, projecting its characteristics and capabilities and devising strategies to make it a reality. Our second goal is to influence, by advocating principles, guidelines and positions that are strategic in nature and address the behavioral, social, cultural and economic processes and structures that both enable and constrain the development of a National Learning Infrastructure. Our third goal is to leverage, by harnessing federal, state and corporate interest in creating an NII in such a way as to realize a significant return on current and future investments in instructional applications of information technology. Our fourth goal is to enable, by creating a forum where those with common interests in using information technology to reengineer instruction on a national scale can collaborate in developing and implementing new learning products and new pedagogical methods. And our fifth goal is to inform, by identifying, endorsing, developing and supporting demonstration projects (prototypes) that seek to advance the state-of-the-art relative to a vision of a National Learning Infrastructure.

The Benefits of Participation

By becoming a Sustaining Member of the National Learning Infrastructure Initiative, you will have the opportunity: to learn; to advance the national goals of the Initiative; to influence the direction of the Initiative; to participate in a high-level national forum on reengineering instruction; to gain access to state-of-the-art information and knowledge; to return to your home institutions or organization and apply the knowledge gained; to take collaborative action to advance your institutional/organizational goals. As Founding Members of the National Learning Infrastructure Initiative, we call upon you to join us. ■

For additional information on the NLII and its founding members, contact EDUCOM at (202) 872-4200 or nlii@educom.edu.

"Be wary about handing the (CIO) job to your finance person, because then information technology could end up as an adjunct to bookkeeping rather than a strategic asset that serves the whole company. Information technology is going to be your company's most important asset. Guard it with your best person."

Charles Wang
CEO, Computer Associates International
"Multiple Choice"
Inc. Technology
December 1994

In Future Issues

- *Why the CIO has to be a member of the president's cabinet.*
- *Today's IT organizational issues and the emerging strategies for dealing with them*
- *Administrative information systems for the year 2000*

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EDUTECH RESPONDS

Q. We've just chosen a new administrative information system, and are about to begin the implementation. It has suddenly occurred to us that we don't really have anyone on campus with the time or expertise to manage this project. Is this something we could temporarily acquire from outside the institution?

A. *Yes, you could do that; there are many companies and individuals that offer this service, some of whom even specialize in the higher education environment. However, this might not be the best option for you. You need to think about the fact that contracting for a project manager means, for one thing, that all of the experience and knowledge that person will gain during the course of the project will leave at the end of the contract. It also implies that there will be a formal "end" to the project and that there will be a time when the valuable services that this person has been providing to you will no longer be needed. More and more institutions are finding, in fact, that project management is an on-going task because as the institution's needs change and grow, the system needs to change and grow along with them. Finally, you need to think about the skills needed for this job; it may be easier (and more effective) to develop an in-house person who already knows the culture of the institution and its particular needs and to train him or her in project management than the other way around.*

Q. The final stage of our networking project is to wire our dorms. Someone on the planning committee has suggested that we could possibly avoid this expense, at least for a couple of years, by putting public computing labs in each of the dorms instead. Any thoughts?

A. *Once upon a time, dorm students were happy (or at least, content) with one public telephone per floor and a single television in the first-floor public lounge. Times have changed. Students are increasingly less likely to put up with having to go to a public room to get their e-mail, or to download their homework assignments. In addition, it is simply not cost-effective these days to spend institutional money on hardware rather than networking. The former is a short-term solution at best.*

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THE EDUTECH REPORT

January 1995

Volume 10
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The Education Technology Newsletter for Faculty and Administrators

The Library of the Future: A Hybrid Model

by David Cossey, Union College

At colleges and universities around the world, everyone is trying to design and speculate about the library of the future. Descriptive titles, such as "the virtual library," "the flexible library," "the library without walls," *ad nauseam*, have been coined to describe the future model of the library. We are all trying to figure this out so we can plan for it and devote our energies and resources into making the library of the future a reality. Library and technology experts are pooling their energies and thoughts trying to come up with plans and models that can be used to move ahead. (For example, the Coalition for Networked Information provides a forum through which many of the associated issues, models, and projects are discussed and influenced.) No one wants to arrive in the future pulling (or riding) a dinosaur.

At one extreme in the discussion are those who do not want any changes. But it is clear that we cannot afford to ignore the issues and remain status quo—the issues and changes will not go away. While we wait, the cost of acquisitions in our libraries continues to soar (with some journals increasing at rates of 10 to 30 percent a year), causing all of us to make the hard decisions of what to continue and what to discontinue purchasing. At the other extreme are those who postulate that we can get by eventually with no paper at all. But many in academia bemoan the possibility of this extreme—that of a paperless library (where have we heard that word "paperless" before? ...perhaps at office automation conferences of the 1970s and '80s).

At the same time, we see technology growing and changing at ever faster rates, invading every aspect of our lives. Nowhere is this pressure more evident than in colleges and universities, where, as we com-

continued on page 6

"A good rule for educational leaders who are trying to come to terms with information technology at their institutions would be, 'Lead or get out of the way.' I say that because, frankly, those are the only real options. The simple truth is that technology is going to transform education (and everything else!) whether we help or hinder the process and whether we watch it happen from the sidelines or take charge of it as leaders."

Elizabeth Baer
Gustavus Adolphus College
"12 Rules for Technology Trendsetters"
EDUCOM Review
November/December 1994

NEWSBRIEFS

PILOT PROJECT ON INTELLECTUAL PROPERTY RIGHTS

A project jointly launched by the Getty Art History Information Program and MUSE Educational Media will address key issues in the educational use of museum images and related information delivered over computer networks. The Museum Educational Site Licensing Project will enable museum and educational communities to develop common solutions to problems now inhibiting the development of computer-based learning tools for the study of art and culture. The pilot project will test the distribution of art images and information from six museums to seven universities. The institutions will resolve issues of intellectual property rights, network security, and information standards, defining the terms and conditions for the educational use of museum images and information on campus networks. The venture will also demonstrate the value of digital media in the study of art and culture.

Participating universities include American University, Columbia University, Cornell University, University of Illinois, University of Maryland, University of Michigan, and University of Virginia. For more information, contact Philippa Calnan, The J. Paul Getty Trust, 401 Wilshire Boulevard, Suite 900, Santa Monica, California 90401; (310) 395-0388.

CAUSE RELEASES DATABASE PROFILE

CAUSE, the association for managing and using information resources in higher education, has just published the *CAUSE Institution Database 1994 Profile*, a 170-page publication summarizing the results from its annual survey of colleges and universities on information technology-related issues. The report includes 158 tables, charts, and graphs covering nine aspects of IT management and use at the 435 institutions responding to a CAUSE survey.

The profile offers composite data as well as data for six categories of institutions. Included are data on strategic planning, management and organization, new and innovative technologies, budget and financial considerations, networking issues, microcomputers and workstations, policy issues, academic computing, and administrative applications. One copy of the profile was sent to each CAUSE member campus. Copies of the report are available for $35 members, $70 non-members, from CAUSE, (303) 449-4430; orders@cause.colorado.edu.

BATTLE OVER COMPUTERIZED TESTING

Computerized graduate admissions tests administered by the Educational Testing Service (ETS) have been challenged by Kaplan Educational Centers as being too vulnerable to cheating. Through tests taken by its own researchers, Kaplan had determined that the pool of questions used in the Graduate Record Examinations (GRE) General Test was too small, and therefore, they charged, the tests themselves too easily replicated. ETS responded by cancelling most of its computerized GRE testing through June. The ETS has since sued Kaplan for stealing test questions in violation of federal copyright law.

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"Planning and Managing the Odyssey"

Almost a decade ago, December 10–13, 1985 to be precise, a large group of people gathered in New Orleans at the annual CAUSE conference to consider the theme, "1995—Planning and Managing the Odyssey." As we begin 1995, it's a bit of a shock to realize that our day-to-day world of higher education information technology could scarcely be imagined by even that admittedly imaginative group of people only ten years ago.

What were we all concerned with back then? To judge from the session content, we were very preoccupied with data security. Certainly a legitimate issue (then and now), data security was also being used, one suspects, to forestall the "invasion" of microcomputers on the desktops of end users, a move heavily resisted back then by many IT managers. A principal argument against the proliferation of microcomputers was the inevitable compromise in security, and many of the conference sessions that year (including the entire Current Issues Forum) were devoted to this.

We were also beginning to make some strides into the issues of strategic planning, organization, and networking. But little did we know how the next ten years would shift our focus. In 1985 we were designing the interface to the newly on-line administrative information system; in 1995, we are designing our institution's home page for the World-Wide Web. In 1985 we were discussing how to involve administrative users in student systems development; in 1995 we are discussing the best ways to provide information access directly to the students themselves. In 1985 we were trying to decide the balance in emphasis between computing and communications (voice and data, with an occasional mention of video); in 1995 we are trying to decide how quickly we can get the dormitories wired. In 1985 we were wondering if having a Help Desk made sense; in 1995 we are wondering whether having any applications programmers on staff makes sense.

No, most of us today are no longer fighting the demons of end-user microcomputing. But there are lots of other demons we are facing, and no one more ferocious than the one of limited resources. While money for computing on most campuses has never been exactly abundant, the resource situation today is worse than we ever could have foreseen ten years ago. The lack of resources is also often accompanied by a skepticism about IT benefits, at least at the top-administration level (a legacy of over-promising ten years ago?), as well as a hugely increased demand in most other areas of the institution. It's safe to say that IT managers today spend more time on this issue, either directly or indirectly, than any other.

> *In 1985 we were designing the interface to the newly on-line administrative information system; in 1995, we are designing our institution's home page for the World-Wide Web.*

Other items capturing our attention now that we did not foresee include the smallness and portability of computing today in enormously powerful, yet astonishingly inexpensive, packages; the popularity (and increasing necessity) of multimedia; the necessity of graphical user interfaces (yes, some still prefer command lines, but those who do are rapidly going the way of microcomputer-resistant IT managers); and the rapid progress toward universal connectivity.

Of course, there are some struggles that remain from ten years ago; perhaps they will be with us always. For instance, we still don't know what academic computing is all about. While we have gotten a bit better at managing academic computing resources, we are still taking our very first baby steps in making a difference to the learning and teaching processes. Many of us thought we would have made more progress on this front by now, but it remains a very, very difficult challenge.

We don't know how to organize, for the most part, yet either. Many of the institutions that ten years ago had separate administrative and academic computing service departments have now combined these; many others have gone in the other direction. The CIO position is certainly more prevalent, but at a lower level in most institutions than many of us predicted back then. And still, most colleges and universities do not have a CIO at all.

One thing for sure: it's still an odyssey ("an extended, adventurous wandering," according to Webster). By the end of the decade we're in now, we will have crossed a century marker as well, and with luck, we'll still be having great adventures as we guide our institutions through the world of information technology. ■

Information Technology as a Healing Force

by E. B. Baatz

The layoffs happened three years ago, but Jack Curry still loses sleep over them. Northeastern University had never endured cuts before, and Curry, the school's president and a faculty member for 25 years, saw faces rather than numbers as he whittled down the payroll. "I knew these people," says Curry, sighing as he recalls that painful time. "It hurt. It hurt personally."

Changes in the job-reduction lexicon suggest that something has happened to the way organizations eliminate employees. Firings, layoffs, and reductions in force—terms that reflect anguished cuts organizations make in times of financial stress—have been replaced by downsizing, reengineering, and rightsizing—less threatening words that suggest the continual adjustments made in order to maximize organizational health. But whether employees are downsized or fired, laid off or reengineered out of a job, their pain remains the same. And therein lies the rest of the story: how organizations recover from the agony of layoffs.

Economists tell us that the 1991 recession hurt the working population as much as the Great Depression. Even as the economy has entered a recovery, and two years after Bill Clinton won office on a jobs-creation platform, workers are still being laid off. Big corporations announced over 615,000 job cuts in 1993, says John A. Challenger, a consultant with Challenger, Gray & Christmas Inc. In the first nine months of 1994, another 418,000 jobs fell beneath the downsizing ax.

These statistics only hint at the psychic toll layoffs have taken on the workforce. People who have experienced the trauma of losing their jobs are the most obvious casualties. But survivors who have watched co-workers pack up their desks, and even some community-minded executives who were forced to wield the ax, have suffered as well. In an admittedly extreme comparison, Margaret J. Wheatley, principal and co-founder of Kellner-Rogers & Wheatley Inc., conjures up the faces of concentration-camp survivors. "Survivors are people who have been traumatized," she says. "Why would anyone want to create a change process that creates survivors?"

> ***While IS organizations are often left licking their own wounds in the wake of reorganizations, they have an important role to play in the subsequent rebuilding.***

If downsizing can be described as a wounding experience, then the metaphor of healing applies to activities designed to salve those wounds. It can also apply to the aftermath of reengineering projects that occur without reducing staff: the reshuffling of jobs and redefining of responsibilities may leave employees feeling afraid and uncertain. In response, bookshelves are beginning to sprout titles like David Noer's *Healing the Wounds* and William and Kathleen Lundin's *The Healing Manager,* written for organizations that must begin restoring morale and productivity.

The Role of IT

While IS organizations are often left licking their own wounds in the wake of massive reorganizations, they have an important role to play in the subsequent rebuilding. IT provides critical communication tools for managers who attempt to combat fear by opening access to information. And in organizations where fewer workers means more work for the survivors, technology is often able to pick up some of the slack. "Downsizing has forced a number of people into our arms," says Patricia Skarulis, vice president and CIO at Rush-Presbyterian-St. Luke's Medical Center in Chicago. "Folks who were less than enthusiastic about IT suddenly begin looking at technology as a way to increase services while reducing staff."

The experience at Northeastern University—an organization that has come through the downsizing wringer—demonstrates that an organization's ability to heal itself requires a soft human touch and, sometimes, a hard technology edge.

Northeastern University's treasurer, Robert L. Culver, was strolling the campus one day last summer, admiring his handiwork. The green, well-manicured park used to be just another gray tract in this gritty urban setting. Suddenly, an employee walking by stared Culver straight in the eye. "That tree represents a secretary, you know," she said. Her resentment was understandable; the decision to spend $500,000 a year beautifying the campus was approved after they were forced to eliminate 700 positions. But for Culver, the choice wasn't between retaining people and planting trees. The workforce had to be reduced; the challenge was to make life better for those who remained.

In 1990, Northeastern had survived a 28 percent drop in freshman enrollment and a $16 million shortfall in its $220 million operating budget. Faculty positions had been reduced by 20 percent over a four-year period—186 jobs—through attrition, buyouts, and early retirement. Another 300 administrative and staff positions were eliminated through similar methods. Students had swallowed an 8 percent tuition hike for two years in a row.

But cost controls proved inadequate. For the first time in its 94-year history, the university faced layoffs: 175 of them by June 1991. Northeastern's president, Jack Curry, knew the only way to make those cuts successfully was to "involve people in the decisions and to make sure everyone saw signs of progress." Staff and faculty "had to see a better life ahead."

So Curry, Culver, and 300 faculty members devised a plan to respond to the crisis. The university had been an open-enrollment institution, accepting 90 percent of all applicants. "Our new strategic vision was to become smaller and better," says Curry. "So instead of 4,000 freshmen and a big bureaucracy, we went for 2,500 freshmen and put the student at the center of smaller classes."

Building hope, even in the midst of layoffs, was key. "We felt it was imperative to restructure our budget to positive priorities," says Culver. IT was one of those priorities, so when Culver and Vice President for Information Services George F. Harris requested a five-year, $50 million budget, Curry approved it.

The plan called for connecting the campus via a fiber-optic local area network, called NUnet, in order to provide data, voice, and video services to users across the institution. "Rightsizing made the selling of NUnet easier," notes Harris. "The concern became how to use technology in order to augment the loss in human resources." Thanks to NUnet, students will soon be able to audit classes and turn in assignments electronically, as well as conduct on-line conferences with faculty and advisers. In addition, a new kiosk system provides information on grades and schedules, all at the touch of a screen.

> ***Northeastern does not demand that departments sacrifice their specific needs in the interests of either standardization or economy.***

Harris believes the IS organization's lead was critical to the healing process. Traditionally a decentralized institution, Northeastern is now encouraging cross-functional teams to collaborate on technology decisions. That enables Harris to negotiate site licenses for all departments at once, and everyone has access to everything. "With cross-functional teams, the admissions department, for example, is no longer concerned just about itself," says Harris. "The issue is, 'How can IS help all of us?'" Still, Northeastern does not demand that departments sacrifice their specific needs in the interest of standardization or economy. "It's important to us that chemical engineering doesn't have to act like the sociology department," says Harris.

These improvements have persuaded many survivors that the institution will continue to look out for them. "We did not have a lot of discord or distrust," says Human Resources Vice President Katherine N. Pendergast. "The dominant feeling among the faculty was one of hope," agrees Richard Daynard, a professor of law.

Although 175 people were laid off, the university faced only one legal challenge. And while nearly 200 faculty positions have slowly disappeared since then, "there has been no controversy in the papers," says Curry. Other signs of success include the fact that average SAT scores for entering freshmen have risen 70 points in three years. The Carnegie Commission has rated Northeastern a level-two research institution, up from level four, placing it in the top five percent nationwide. And with a $225 million development drive underway, the university has broken ground for a new engineering and science complex—a pleasant complement to all the trees sprouting up. ■

E. B. Baatz is a senior writer with CIO magazine. This article is reprinted with permission from the December 15/January 1 edition of CIO.

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The Library of the Future: A Hybrid Model ...

continued from page 1

pete for students and faculty who need and want technology to assist in learning and practicing their learning and research endeavors, to not get involved in technology would be fatal. Traditionally, the heart of the academic institution has been its library, where one could spend time searching the aisles and catalogs and could determine the priorities and look into the heart of the institution. Not only the volumes, but also the scholars who walked the aisles and pored through the materials, demonstrated the life beyond the classroom where ideas were tested, explored, and perhaps debunked.

Those of us who love books resist even the thought of the day when there may be no more books published in paper form—we resist it by saying "never." But I am running out of room for more books—too many are still in boxes from two moves ago. Even I am at a time when I will purchase fewer paper materials and more electronic materials. Already equipped with a computer, I now also have CD-ROM capability and have begun to purchase materials on CD-ROM that once would have been available only on paper.

A Hybrid Future
At this point some would say that I clearly have a choice—either paper or electronic purchases. But there is also a third, and more realistic, option—a hybrid future with some items in paper, some electronic. Today we can see the sorting out of some of these options for the near future (five to ten years). We may be headed to a time when, for some items, we do not have that choice. I can already imagine that publishers of encyclopedias are feeling pressure in the publishing of their paper editions. The cost of producing a 25–30 volume high-quality up-to-date work is increasingly expensive, while publishing on CD-ROM can be done at a fraction of the cost. The CD-ROM version can also be published each year with the revised articles always "in order." No longer do we have to contend with the annual update supplements that make us look in several different places to find all the information on a topic. There are also CD-ROMs that contain material that is of historic significance to scholars; the material is out of print (and too cost prohibitive to reprint). The production of works on CD-ROM is and will continue to increase the accessibility of precious resources (archival material, original works and manuscripts, etc.).

> ***Not only the volumes, but also the scholars who walked the aisles and pored through the materials, demonstrated the life beyond the classroom where ideas were tested, explored, and perhaps debunked.***

The hybrid model of the library of the future can provide us with a working plan. Much effort is currently being done to provide access to reference materials and journals electronically. On the other hand, if the current state of most bookstores is any indication, there is not much effort in making monographs (books) available electronically (except older works for which the copyright has run out). Even the CD-ROMs that are showing up in bookstores are mostly of the reference variety (along with games and educational software).

In addition to CD-ROM, the increased and pervasive access to the worldwide Internet is providing an impetus to providing access to works and materials in other than paper form. It is also pushing the question of access-versus-purchase of works into the forefront. Publishers are experimenting with new ways to provide access while protecting the rights of the producers of materials. Today there are publications that are available only electronically over the Internet, while others are providing a dual access, and still others are contemplating their fate in a future more dominated by electronics and cable or satellite intrusion into the home and workplace.

The Economics of Publishing
One of the major stresses that is pushing us into the future is the rising cost of publishing on paper. It has already become far less expensive to publish on CD-ROM for many works. Publishers will switch to the newer medium to cut their costs. They can make this switch because of the rapid increase in the number of CD-ROMs purchased by consumers. This will serve to push much of the overhead cost to the purchaser of the works, since the consumer must purchase the equipment necessary to read the works.

We are headed for a future in which reference works and journals will be increasingly available electronically, and consumers (individuals and libraries) will vote with

David Cossey is Executive Director of Computer Services at Union College in Schenectady, New York.

their dollars. Already many libraries are voting with their dollars to cease purchasing journals, culling their collections down to the core (and many would say to the bone). Much scholarly communication is already done electronically. A friend of mine at a large university told me recently that there are over 30,000 electronic mail messages sent from his institution *every day*. The cost of sending these by first-class mail would be prohibitive. I am not commenting on the merit of all these messages, but then no one was looking into this when the post office was the only one providing the service either.

The electronic publishing of today is only a shadow of what the future will hold. The CD-ROM of today holds 600 MB of information—enough for hundreds of thousands of pages of text. Already, CD-ROMs are available that can hold a 25–30 volume encyclopedia with high-quality pictures, sound tracks, video clips, etc.; a country-wide phone book can be put on one CD; so can a road atlas or street maps for the entire country. It is already possible to have a modest CD collection that encompasses thousands of volumes. At least one major institution of higher education is thinking about putting its entire curriculum (textbooks, syllabi, etc.) onto CDs for distribution to the entire student body.

Nevertheless, while 600 MB seems like a lot, it is already proving to be limiting, as multi-volume CD works begin to proliferate. We will have CDs that hold 10 times the current amount of information in the next two or three years (some say even sooner).

In the near future, monographs (books) will continue to dominate in paper form—until the consumer votes otherwise.

Preparation Needed Now

The future comes to us each day, and we cannot afford to fight a rearguard action. We must explore the capabilities that the technology brings. Only then can we be prepared to decide the best way to provide access to the scholarly materials that are the life of an institution of higher education. We must start exploring the options that are available now. We will then be able to evaluate and understand the pluses and minuses, think about and discuss the potential, and extrapolate to the future.

We must also begin building the infrastructure to allow for electronic access. It is past the point at which we can deny a future for the role of electronics in our libraries. We will probably not see a completely paperless library in the near future, but we will certainly see at least a hybrid library. We need to be prepared. ■

> **"Computer folk have counted lots of things for lots of years. Most of those things had to do with the arcane details of how systems 'performed.' They were measurements of inputs rather than outcomes and were tenuously, if at all, related to business product: learning outcomes. We need to turn our attention to helping faculty and learners measure outcomes and the costs required to produce those outcomes.... We simply must devote some time and effort to demonstrating, in a measured way, the payoff from using information technology in higher education."**

Robert Heterick
President, EDUCOM
"A Stone Soup"
EDUCOM Review
November/December 1994

In Future Issues

- *Applying Disney's service model to campus computer services*
- *Why the CIO has to be a member of the president's cabinet.*
- *Today's IT organizational issues and the emerging strategies for dealing with them*

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EDUTECH RESPONDS

Q. Complain, complain, complain. Now our administrative users want a whole new information system. All that cost, and yet I have not heard them mention a single thing for the new system that our current system doesn't have—or that we couldn't add very easily. They think that in a new system, everything's going to be available at the push of a button, but we know better. They're just setting themselves up with a bunch of unrealistic expectations. How can we get across to them that they don't need to do this?

A. *We'll go along with the part about the danger of unrealistic expectations, but we don't buy the rest. What you think are the virtues and features of your current system are apparently unknown to your users; that means, for all practical purposes, they don't exist. It could be that they're just too hard to find, or just too hard to use once they are found; it could be that the users don't want to have to spec out every new feature before you get the thrill of programming it for them. Our experience suggests that most users do not complain unless there is something legitimate to complain about, and it would behoove you to stop being so defensive and start listening. Keep in mind the lessons learned by VCR manufacturers: possible does not necessarily mean useable, and only users can judge the latter.*

Q. I have heard of reselling long distance and other telephone services to students in dormitories, I have heard of partnerships with cable TV companies to wire the campus and sell TV offerings to students, and I have heard of campus computer stores. But this is a new one on me—a long distance provider offering telephone cards to alumni that result in a contribution to the school every time a long-distance call is made with that card. Another way to get money for IT!

A. *Yes, that's a relatively new twist on raising money. We suspect we're only seeing the beginning of plans and strategies to increase the resource pool that can be used for information technology. Otherwise, it's a matter of reallocating existing institutional funds to pay for IT initiatives, harder and harder to do as other priorities (such as faculty salaries and leaky roofs) compete for attention.*

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The Education Technology Newsletter for Faculty and Administrators

Emulating Mickey Mouse Without Feeling Goofy

by Howard Strauss, Princeton University

Garbage. Peeling paint. People locking their keys in their cars. You wouldn't think it, but lately these are some of the things I've been most concerned about. And children discovering that they are too short to go on a ride after waiting for an eternity in an endless line. And guests forgetting where they parked their rental cars and not even remembering what make and model they were. And cast members doing more than just making sure that rides work. Those things too have taken on great importance to me.

Usually when I return from an EDUCOM or CAUSE conference, my head is filled with the latest information technology news, and I spend countless hours trying to apply the neat things I've just learned to my work at Princeton University. That is, of course, how it should be. Like others involved in the delivery of information technology services at colleges and universities, a critical part of my job is keeping up with the rapidly changing technology and effectively applying it at my home university. Our users, like yours, I'm sure, expect that their information technology organization will provide cutting-edge technology to everyone everywhere.

So there is no time to dwell on garbage or peeling paint when I have to be thinking about client/server paradigms, object oriented programming, CASE tools, video conferencing, multi-media, ATM, VLSI, TCP/IP, PowerPC, Z39.50, WWW, SGML, PCMCIA, PDAs, and when Windows95 will be released. But since I have returned from CAUSE '94 I have concluded that garbage, peeling paint, and the rest of this long but odd list of items ought to take precedence over all of the technical things my job title requires me to spend every waking

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"Colleges and universities too often avoid factual analysis, but rather hope to reduce costs and push blindly toward client/server systems urged on by departments and vendors. Interestingly enough, some of the same people who initially questioned the consequences of unplanned infusion of microcomputers and now question the wisdom of client/server-panic are again being labeled 'mainframe bigots'"

Martin Solomon
University of South Carolina
"The Need to Rethink
Decentralized Computing in
Higher Education"
CAUSE/EFFECT
Winter 1994

NEWSBRIEFS

RUTH LILLY GIFT FUNDS HIGH-TECH TELECOM SYSTEM AT WABASH

They may study Latin in a building constructed in 1833, but the students of Wabash College will soon have access to one of the highest-tech campus communications systems in the United States. The Wabash Board of Trustees voted recently to provide the liberal arts college for men with a sophisticated telecommunications system that will propel the entire campus into the fast lane of the information highway.

The new $1.6 million system is being partially funded by a gift from Mrs. Ruth Lilly of Indianapolis, and will allow every residential student of the 800-plus student body, and all faculty and staff members to have permanent, personal telephone numbers. The system will also allow access to voice mail, directory services, free local calls, mail lists, bulletin boards, conference calls, and access to the Internet and all its services, such as Gopher and World Wide Web. Personal phone numbers that stay the same throughout a student's campus career and a "port per pillow" will distinguish Wabash from other institutions by the breadth and depth of the communication it provides.

For further information, contact Bill Doemel, Director of Computer Services, at (317) 364-4311; doemel@wabash.edu.

NEWS FROM EDUCOM

Educom, the association dedicated to the transformation of education through information technology, has announced that Jim Mingle, executive director of the State Higher Education Executive Officers Association (SHEEO), has joined the organization as a Visiting Fellow for one year. Mingle will focus on Educom's National Learning Information Infrastructure (NLII), a program aimed at facilitating the restructuring and reengineering of learning environments in higher education. The NLII's mission is based on action-oriented collaborations among higher education, educational organizations, technology industries, and public policy leaders for the purpose of containing or reducing rising costs in higher education, increasing access, and promoting significant improvements in the quality of student learning.

For more information about the NLII, contact Educom at (202) 872-4200 or send e-mail to nlii@educom.edu.

SITE 95 CONFERENCE

The Society for Information Technology and Teacher Education (SITE) is holding its sixth annual conference on March 22–25 in San Antonio, Texas. The conference will consist of papers, panels, tutorials, workshops, poster sessions, and demonstrations. There will be special strands for diversity and international perspectives, social studies, reading and language arts, special education, math/science education, and early childhood issues. For more information, contact SITE 95, P.O. Box 2966, Charlottesville, Virginia 22902; (804) 973-3987; aace@virginia.edu.

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Campus Computing: Education or Edutainment?

by Gordon Sherman, University of Tennessee

It seems clear that the trends in academic computing in our universities largely reflect the more general trends in higher education, which have been noted recently by a number of writers.

A case in point: universities (even some which were once regarded as respectable) now routinely corrupt themselves by luring athletes onto their campuses—athletes who still lack the fundamentals of a higher education when they depart those universities, with or without academic degrees of any kind. An analogy can be drawn between such practices for providing entertainment and the trend toward "edutainment" in campus computing, which is intended to support academic programs at our colleges and universities.

I doubt that we have ever seen so much enthusiasm and happy speculation regarding the vast opportunities for massive improvement of the human intellect as took place during the birth and adolescence of modern computing machines, circa 1950–60, and on into the 1970s. These remarkable new machines, it was predicted by some of the brightest academics of the day, would free human minds from tedious mental labor, thereby enabling those minds to more vigorously pursue intellectual goals at much loftier levels.

Sad to say, there's not much evidence to support those early predictions.

As it's turned out, such forecasts were mostly backwards. The quality and rigor of quantitative work in higher education were much higher *prior* to the availability of modern computers. The way computing in higher education has evolved during the past several decades has placed overwhelming emphasis on the production of mere numbers—billions and trillions of them—every day, every hour.

> *I believe the trend is that people working in the area of providing computer resources for teaching and learning are striving to be merely popular, to hold a job, and to please the prevailing conventional wisdom.*

Academic computing once focused on insight, not numbers. Now, little attention is given to improving, or even maintaining, competency in the critical analysis of what the numbers might mean. In real ways, easy access to modern computers is resulting in less—not more—application of human vigor to intellectual goals.

Yet the current popular literature extols the splendors of the expanding availability of modern computing technology for everyone. Now the technology "enables"; the numbers can all be reduced to pictures on a screen, in color no less, like an elaborate television production. This, it is usually claimed, is real progress in education. It is commonly predicted that anybody, any blockhead, can be magically turned into a well-educated person by it all, and in short time.

This tendency may simply be symptomatic of a far more pervasive trend, that is, the deterioration of U.S. higher education in general as described by a number of capable, serious people such as Allan Bloom (*The Closing of the American Mind*) or Charles Sykes. Nevertheless, those of us who have had a large part of the responsibility for introducing and nurturing modern computing technology in the higher education environment, all in the pursuit of improving human intellect, cannot be excused for botching the job merely because the control of our colleges and universities is often in the hands of incompetents.

People with the capacity to understand the power of modern computer technology and the potential of its working relationship with the human intellect should be expected to have produced more of value by now. But alas, I believe the trend is that people working in the area of providing computer resources for teaching and learning are striving to be merely popular, to hold a job, and to please the prevailing conventional wisdom, no matter how wrong that wisdom may be.

In fact, a sadly telling point is that the corporate business mentality has so corrupted higher education that many of the people responsible for the guidance of universities and university academic programs now actually refer to students as "customers" rather than as seekers of knowledge for its own sake. ■

Gordon Sherman is Professor Emeritus at the University of Tennessee, Knoxville. This article appeared originally in the May/June 1994 EDUCOM Review, and is reprinted with permission.

Emulating Mickey Mouse Without Feeling Goofy ...

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hour worrying about. This seems to be no minor temporary diversion that we technical people are often predisposed to. Not only have I focused on these odd issues, but I have come to think that it is essential that everyone at Princeton who delivers information technology have the same focus. So should all of you. In fact it is essential for your survival as information technology providers.

Mickey Mouse Management

One of the speakers at CAUSE '94 was Dennis Snow, a Customized Program Specialist for the Walt Disney organization. Since CAUSE '94 was held at the Walt Disney World Resort which is just a short Disney-owned boat ride away from Disney World and EPCOT Center, it was no surprise to find someone from the Disney organization was addressing CAUSE. After all, Disney does some incredible things with computers. But Dennis was not a computer maven and never even mentioned computers or their use at Disney. What he talked about was how the tens of thousands of Disney employees (whom Disney calls cast members) are able to deliver consistent cutting-edge service in everything they do for their customers (called "guests").

There is no way I can reproduce even a fraction of the information Dennis gave us nor a scintilla of his pride, commitment, loyalty, and enthusiasm. However, he opened his talk by asking the assembled masses their general impressions of Disney World.

"Everything is so clean and neat," was a common response. "Everyone is so friendly, helpful, and happy," was another. "Things are so carefully laid out and easy to find. Everyone is always smiling. The good feelings are contagious. It must be the pixie dust." Every response was about Disney's nearly perfect service and the attitude of its employees—I mean cast members. What you didn't hear was how wonderful the rides were, that they almost always worked, that the technology was awesome, or even that it was so expensive to go to Disney World.

What would happen if you asked a group of your users their impression of your IT organization? Would they say, "Their systems are so clean and neat"; "Everyone is so friendly, helpful, and happy"; "Just visiting the Information Technology Office lifts my spirits"? Of course not, and one problem is that no one would expect that to happen and might even be chagrined if it did.

> *It would be easy to think that since we do not run Disney Worlds, Mickey Mouse Management is just goofy for IT organizations.*

IT organizations expend Herculean efforts to build state of the art networks which connect lightning fast workstations running the latest intelligent applications. Our organizations include the best programmers, system designers, network specialists, and support personnel armed with the most sophisticated software tools. A user who missed all that and saw our friendliness as the most salient feature of our organization might be a disappointment and embarrassment. It would be easy to think that since we do not run Disney Worlds, Mickey Mouse Management (MMM) is just goofy for IT organizations. But it turns out that MMM is what creates the pixie dust that puts the magic in everything Disney does. And IT organizations need magic even more than Disney.

Disney Stories

Dennis told us that one reason Disney parks are so clean is that when any Disney cast member (employee)—from the CEO to the lowest paid temp—sees trash in the park, he or she picks it up and disposes of it. Everyone does this every time. Sure, Disney has cast members whose main job is picking up trash, but every Disney employee wants the parks to look clean and neat, so errant trash is given no rest. Disney cast members also report peeling paint. While they can dispose of trash themselves, painting Sleeping Beauty's castle is something best left to the experts. But all cast members believe that it is their job to make anything nicer if they can, and to report anything that needs fixing that they can't fix themselves.

Dennis also told us what happens when someone locks their keys in their car (which happens tens of thousands of times each year) or forgets where it was parked. Both of these things are examples of users (oops, guests) doing something dumb and easily avoidable. It is also something that Disney can readily predict will happen.

Every person who directs cars into parking spots carries a wireless communicator. When someone

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Howard Strauss is Manager of Advanced Applications at Princeton University. This is Part One of his article.

locks his keys in his car, the parking cast member stops for a moment, empathizes with the family locked out of their car, calls the Disney locksmith van, then resumes directing cars into parking spots. The locksmith van arrives in minutes or less, carefully breaks into the car, retrieves the keys, and while the user reaches for his wallet, refuses any payment—even a tip—and dashes off to the next guest who is locked out of her car.

After a day at the park, guests return to the parking lot and often forget where they parked their cars. The response to the question, "What kind of car do you have?" is usually, "The white rental car." Once again, parking cast members stop what they are doing, empathize with the guests, and ask them what time they entered the park. Parking is so well controlled that given the time a guest entered the park, the location of their car can be narrowed down to a few dozen cars. In all cases, the guest is helped to be quickly reunited with his or her car.

There are plenty of other Disney stories, and they all have the same theme—doing everything possible to provide for a guest's happiness, safety, and comfort.

The Magic Is You

How does Disney get its cast members to provide this level of caring service? It starts with a company culture and philosophy that insists that all employees understand that their jobs are the corporate mission, not their job titles. What is the job of a person who directs cars to parking spots? Providing the best vacation and entertainment experience possible. And that is the job of hamburger flippers, hotel maids, and the CEO. Disney philosophy, culture, and corporate goals have been reduced to a few basic rules which all cast members adhere to all the time. Instead of a corporate mission statement readable only by lawyers and universally ignored, Disney asks its cast members to treat everyone as a guest (employees, guests, vendors, everyone), to fuss with details, and to exceed people's expectations.

Even before someone is hired, he or she gets to see a film that emphasizes the company philosophy and culture. Even temporary summer employees spend two days of orientation that stresses the corporate philosophy of how to treat people, the importance of exceeding people's expectations, and the importance to the corporation of every cast member. At the end of the two days of orientation, cast members have either packed up and gone home or they have begun to understand that the magic of Disney is really in every cast member. During these two days of orientation, hamburger flippers and financial vice presidents go through the same program together. This reminds all cast members that the rules apply to everyone equally and that everyone's job is important to the corporation.

> *This level of service starts with a company culture that insists that all employees understand that their jobs are the mission, not their job titles.*

Disney on Campus

Disney has decided that while cutting edge technology is essential, it is discounted by users. Theme park attendees expect the rides to be state of the art, safe, and working. They expect hotels to have maid service, ice machines, and elevators. If the technology and essentials are not in place, users will complain, but if everything is just working, no one will say, "Wow, they didn't run out of milk shakes today. This is really a great place."

Disney's edge is cutting-edge service. It knows it is in the entertainment business, not the theme-park business or the movie business. Technologies come and go and can be provided by outsiders, so their corporate philosophy can't be based on technology. Disney has based it instead on friendly, helpful people, fussing with details and exceeding people's expectations.

Yet, IT organizations still act like they are in the technology business. They never should have been in the technology business anyway; they should have been in the information services business. In the past, it was just inappropriate for campus IT organizations to be in the technology business. Today it is an anachronism. Campus IT organizations used to develop operating systems (e.g., MTS), compilers (e.g., WATFOR), and text processors (e.g., SCRIPT). That will never happen again except for tiny niche markets. Today, and for the foreseeable future, these technical tours de force will be built by companies like Microsoft and AT&T, or possibly Sony and Nintendo. But most campus IT organizations' reaction to this trend has been to decide that they should give up building compilers and operating systems and instead build networking systems and campus-wide in-

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formation systems (CWISes). This will be a short-lived diversion. Campuses will find it more cost-effective to buy networking software and CWISes than to build them or even use the free ones that abound. Gopher and Mosaic may be the last of this type of free, loosely supported software developed and maintained at great cost and then given away.

In the future even the function of providing Internet access is likely to be done by America OnLine, Prodigy, Delphi, Microsoft, or other commercial Internet providers as they get more adept at providing these services. They will soon be able to provide a higher quality interface at less cost than we will be able to do for ourselves.

Users now largely have their own computers on their desks and run commercial software they have purchased themselves. The high technology that we thought was our business has become a commercial commodity that our campus cottage industries cannot compete with. But our users need help with this high technology web in which they have become entangled and dependent on. The Disney approach to management offers us an effective way to move to the service business we must be in to survive, and it will provide our users with the help they really need. But to do that, we must understand how garbage and peeling paint apply to us.

Garbage and Peeling Paint

Truthfully, there is not much garbage on our campus, but when I did see some I used to walk by it. Not any more. But garbage is really anything that detracts from the best experience a user can have that you can fix yourself. On your way to lunch, if you see a bewildered looking user, do you offer to help? If you see an icon missing from a public computer screen do you put it back? If a computer is left on that should be off, a document out of place, an expired notice on a bulletin board, a candy wrapper on the ground, or any of a hundred little things that you could fix, do you pick up the garbage (i.e., fix the problem) or do you walk on by?

It is also probably rare to see actual peeling paint on your campus. But would you report it if you saw some? You should. But peeling paint is really anything that detracts from the best experience that your users can have that you cannot fix yourself. Does your web server point directly to something in poor taste? Report it. Fuss about it. Don't say that the web server is not your job; your job is offering your users the best service possible and anything that detracts from that is your job.

> *The high technology we thought was our business has become a commercial commodity that our campus cottage industries cannot compete with.*

Do you see a document out of date or missing? Is some system designed in a way that you know can be improved? Is someone in your organization offering less than the best service? You are looking at peeling paint and your users will certainly see it too. Report it. Fuss about it. Follow up on it. The happiness of your users and the success of your organization is your responsibility. It cannot be delegated or assumed to be the province of someone higher up.

Getting Oriented

Making this happen in your organization is not easy. You probably have a new-employee orientation, but it is likely just an hour or two describing the university benefit programs. It certainly isn't two days of getting the feel of the corporate culture, understanding the university's mission, learning how to treat each other and faculty and staff, and being energized to go out and be part of the magic of Euphoric State University. Your employees need this kind of thing. If your human resources people think this idea is daffy, then do it yourself on whatever scale you can.

To get people to pick up trash and report peeling paint requires a change of culture. What happens in your organization if you report peeling paint today? Are you told it isn't your job? Are you ignored? Are you ostracized as the messenger bearing bad news? Is your loyalty questioned? Are you reminded that you don't do your job perfectly either? With reactions such as these you will not get people to pick up garbage or report peeling paint.

Employees will first have to learn what garbage and peeling paint really are. Then they will have to be assured that picking it up and reporting it is a good thing to do. For a while they will do this because they know it is expected of them, but the real breakthrough will come when it become personally unacceptable to them to have garbage and peeling paint in their environment.

Part Two of this article will appear next month.

IT Helps Cope with Disabilities

The National Science Foundation has announced that it has awarded a two-year, $200,000 grant to the American Association for Higher Education (AAHE) to create materials that will help disabled students study math, science, and engineering. The grant work will be carried out by EASI, an AAHE program that uses information technology to help people with disabilities achieve full participation in education programs, both as students and faculty. The materials will be based on EASI's ongoing work on "adaptive" computing technology and access to electronic information for people with disabilities. EASI will emphasize using the Internet to distribute this project's work to the largest possible audience.

"We're thrilled with the award," said Dr. Norman Coombs, chair of EASI and director of the project. "We've spent the last six years creating and distributing materials that have helped thousands of people with disabilities use computer technology to go through school and move into the workplace. This grant will allow us to tackle the tough challenge of providing good information about how people with disabilities can use information technology to work effectively in science and math. It's especially difficult to provide access to these fields, and it's well past time that people with disabilities get the tools to gain access."

Dr. Larry Scadden of the National Science Foundation said that the project would break down many of the attitudinal and informational barriers that now impede entry into these academic tracks. "Far too frequently students with disabilities are steered away from courses in math and science because teachers and counselors do not know if these students will be able to participate in the classes and labs or complete their assignments," he said.

Steven Gilbert, director of technology projects for AAHE, said that the organization has put a great deal of effort into preparing for the project and has already begun work. "For this project, the leaders of EASI have put together a group of consultants that includes some of the finest science, math, and disability experts in the country. They represent hundreds of professionals who continue to give time and share knowledge through EASI's on-line activities."

AAHE and EASI will begin distributing materials for this project as they are developed. In addition to traditional dissemination methods, EASI will also distribute materials electronically. For more information, contact Steve Gilbert, (202) 293-6440; gilbert@clark.net. ■

> **"I come from a school that believes that ridicule of ridiculous ideas is a legitimate debating strategy. It might be possible to express my ideas less dramatically—maybe even within somebody's prescribed limits of gentility and decorum. But would they then be the same ideas and present the same critique? I don't think so. Ban the medium of flaming, and you ban the message of dissent. It's time to remember our sacred and distinctive traditions of academic freedom and to ask basic questions about who will control the Internet and how. If the Internet is to be free, the default position must be ON."**

Jesse Lemisch
John Jay College, CUNY
"The First Amendment is Under Attack in Cyberspace"
The Chronicle of Higher Education
January 20, 1995

In Future Issues

- *Applying Disney's service model to campus computer services - Part 2*
- *The impact of telecommunications on higher education*
- *Today's IT organizational issues and the emerging strategies for dealing with them*

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EDUTECH RESPONDS

Q. We're considering the possibility of equipping all of our faculty members with computers. While universal computer literacy among the faculty is a generally agreed-upon goal, many argue against placing a computer on every desktop because they maintain that our faculty are not in their offices enough to justify the expense.

A. *When one takes into account summers, breaks between semesters, sabbaticals, conference travel, meetings, and the increasing amounts of time spent working from home, one might well argue against desktop computers. This will vary from institution to institution, but it might be cost-effective to think about laptops rather than desktops, especially with the associated declining costs and increasing capabilities, not to mention lighter weights and longer battery lives.*

Q. We've been going around and around about training on this campus, and can't seem to reach a good resolution about the right approach. Our folks need training in the general use of computers, as well as in specific applications such as word processing and spreadsheets. Then there's the administrative information system, which now goes way beyond just administrators and staff all the way to faculty, deans, and the president. All of this is getting very expensive and besides that, no one is at all too sure how effective any of it is. Any suggestions?

A. *First, it's increasingly important to identify training as a formal component of any hardware or software installation. That is, training is as important a part of successful and effective computer usage as the hardware and software itself—we've all given it short shrift for too long. It needs to have its own budget and implementation strategy. Second, we suggest targeting those with the greatest potential impact on the institution (typically, the president, some deans, and the front-line student services people) to receive specialized, one-on-one training in whatever will help them do their jobs better. This is a way to build leverage—every minute saved for these folks and every task made easier by technology translates into better institutional decisions and better student service. For all others, cost-effective alternatives such as classroom training, videos, on-line tutorials, and so on, should go a long way to addressing this area.*

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A Question for the CEO

Campus of the Future or Future of the Campus?

by William H. Graves, University of North Carolina

My university is in the midst of a search for a chancellor. The local press has quoted varied voices speaking to the qualifications and issues that should inform the search. No report, however, has mentioned how information technology is altering the educational landscape and providing new leverage for rethinking some pressing problems confronting higher education. To articulate this perspective, I wrote a letter to the search committee and now am recasting my viewpoint for others who share the concerns that animate any executive search in higher education.

Higher education executives must confront the challenge that lies in the intersection of the expanding educational potential of information technology and the mounting external pressure for more accountable and cost-effective instructional programs. We should expect our executive officers to understand that information technology, already a budgeting problem in its own right on most campuses, is also the most viable tool for addressing issues of educational quality, educational access, and instructional costs.

Similar concerns have been expressed by several distinguished national groups. For example, the Pew Higher Education Roundtable recently released a report, *To Dance With Change*, which stated, "The changes most important to higher education are those that are external to it. What is new is the use of societal demand to reshape the academy. The danger is that colleges and universities have become less relevant to society precisely because they have yet to understand the new demands being placed on them. ... [Americans need] real assurances that shifting economic and political fortunes will not place a higher education beyond their grasp. ...It is precisely that promise that is being em-

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"We used to be able to teach an architecture student with a T square, a few pencils and some triangles. Now we need a $5,000 workstation, with peripherals and software, and a staff to run the laboratories. It's a mind-boggling change in the educational enterprise."

Lawrence Speck
University of Texas at Austin
as quoted in
"Wiring the Ivory Tower"
Newsweek
January 30, 1995

NEWSBRIEFS

REENGINEERING THE CAMPUS

"Reengineering the Campus" is a half-day seminar cosponsored by the University of North Texas Department of Higher Education, College of Education and James Martin & Co., scheduled to be given in various locations throughout March and April. Each seminar will be presented by local IT experts and by Dr. Valerie McIntyre Sherwood, the Director of the Reengineering in Higher Education Project at the University of North Texas.

Seminar topics include an introduction to the enterprise engineering approach; components and tools; implementing a reengineering program; the "state-of-the-art" of reengineering in higher education; the RFP process; and working with consultants. The cost of the seminar is $75. For more information, contact Dr. Valerie McIntyre Sherwood, 6133 North River Road, Suite #600, Rosemount, Illinois 60018; (214) 770-7530; v.mc.sherwood@interramp.com.

CUMREC '95 CONFERENCE

This May 7–10, CUMREC will hold its fortieth annual conference of the College and University Computer Users Association, hosted by Michigan State University in Traverse City, Michigan. Many special events are planned to mark the progress made in university computing over the past 40 years. Some of the events include a champagne toast in honor of Frank Martin, founder of CUMREC. There will also be an historical exhibit to remind everyone where we have been as well as speakers who will provide a glimpse of the future.

The conference will include 42 colleague presentations in six tracks: Information Highway, Current and Emerging Technologies, Leveraging Information, Human Factors and Teamwork, Organizational Change, and Enabling Technologies. There also will be 12 vendor presentations plus six sessions from the Gartner Group on the ever-changing future. Early registration fee is $350; after April 7, the registration fee will be $390. For more information, call (517) 353-4420, ext. 268; cumrec95@msu.edu.

CAUSE BOARD ENDORSES STANDARDS

At its December 1994 meeting, the CAUSE Board of Directors endorsed the concept of an information resources environment built upon open computing standards and is recommending that CAUSE member institutions consider adoption of the Open Software Foundations's Distributed Computing Environment (OSF DCE) as part of their information resources architecture.

According to Jane Ryland, CAUSE President, "Our member institutions are struggling with limited financial resources, to harness the power of information technology and information resources to better accomplish their missions by building distributed, networked computing environments. Open standard solutions offer potential for collaboration and sharing that can benefit all by facilitating interoperability, both within a campus and between institutions."

For more information, contact CAUSE at 4840 Pearl East Circle, Suite 302E, Boulder, Colorado 80301; (303) 449-4430; info@cause.colorado.edu.

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Prospectus for Project FUTURE

by Randy Bass, Georgetown University

The FUTURE Task Group of the American Association for Higher Education's Teaching, Learning, and Technology (TLT) Roundtable Program will address a wide range of questions relevant to the reconfiguration of the faculty role in institutions of higher education. As information technology becomes increasingly integral to many aspects of education, the role of the faculty as teachers, professionals, and members of institutional communities necessarily changes.

Project FUTURE will serve as a bridging project between two important initiatives of the American Association for Higher Education (AAHE): the TLT Roundtable and the Forum on Faculty Roles and Rewards (FFRR). From the TLT Roundtable initiative, Project FUTURE brings a central concern for improving teaching and learning by integrating information technology into the mainstream of higher education. These basic interests fit tightly with some of the issues at the heart of the FFRR, including new ways of looking at faculty workload, improved evaluation of teaching and professional service, examination of shifts from individual to collaborative faculty productivity, reconsideration of faculty in the advising role, and new ways to imagine and create connections between the academy and society.

The FUTURE Task Group has five main goals: 1) to examine the ways in which the use of information technology is changing and will change faculty work; 2) to examine ways that these changes alter evaluation and rewards; 3) to formulate guidelines and models for policies and practices for the evaluation of faculty using technology; 4) to formulate guidelines and resources for peer review and evaluation of teaching, scholarship, and service that integrate the use of information technology; and 5) to foster and facilitate the implementation of institutional policies on the evaluation and reward of faculty work that integrates the use of information technology. These goals will be pursued through the three traditional categories of faculty work (teaching, scholarship, and service) even though the boundaries between these categories are shifting, and indeed the application of information technologies is one of many forces influencing that shift.

(1) Development of instructional applications of information resources and technology. Considerations include: How does the use of technology interact with teaching methods and philosophy to construct the faculty role? How does the integration of information technology into teaching affect the structural aspects of learning contexts (such as contact time, in and out of classroom teacher/student interaction) and how do these structural changes impact on faculty work? How does the application of information technologies contribute to shifting boundaries between teaching and research, scholarship and pedagogy? How might instructional applications of technology get evaluated as applied scholarship and/or innovative teaching? How should faculty get reviewed and rewarded for increased investment of time required to prepare and implement information technology into teaching? How might the innovative use of technology be represented within the overall teaching "portfolio" and career construction of faculty?

(2) Technology and service. Considerations include: How are the forms and nature of professional, institutional, and community service affected by faculty use of information technology? How might the integration of information technology play a role in reconsidering connections between the academy and society? How do increasingly collaborative work patterns impact on the area of service? How does faculty and student use of information technology affect the faculty role in advising? How does the spread and growth of technology from the "early adopters" to the mainstream place service demands on the "early adopters" to assist in faculty development and training, and how should that service be recognized and rewarded?

(3) Technology and scholarship. Considerations include: How do new forms of electronic publication fit with traditional standards and practices of peer review, evaluation, and reward? How do new forms of electronic publication get reviewed and evaluated? How do new forms of collaborative work and knowledge-making activities facilitated by information technologies alter the nature of scholarship, publication, and evaluation?

The FUTURE Task Group will begin organizing immediately. There will be a session at the National Conference for Higher Education, in Washington, D.C. March 18–22. For more information, contact Randy Bass, English Department, Georgetown University, Washington, D.C. 20057; (202) 687-4535; rbass@guvax.georgetown.edu. ■

Randy Bass is the director of the Center for Electronic Projects in American Culture Studies at Georgetown University. His prospectus first appeared on the AAHESGIT listserv.

A Question for the CEO ...

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bedded in the new electronic superhighway—which may turn out to be the most powerful external challenge facing higher education, and the one the academy is least prepared to understand."

Indeed, the public and the body politic at all levels are worried about the spiraling price of a higher education and the value it delivers. The heft of higher education's costs lies in instructional programs, mostly in instructional personnel. If we are to contain operating costs per student, whether paid from private or public coffers, then investments in personnel and programs must be as productive as possible. But attempts to optimize the productivity of instructional investments within today's labor-intensive contact-hour paradigm are likely to abridge quality by increasing either class sizes or course loads. Not even distance education can resolve the quality/quantity trade-off inherent in the contact-hour model, although it can increase access to education while requiring less capital investment than new bricks and mortar. The contact-hour course delivered from any distance is labor-intensive.

This line of thought argues for strategic experimentation with alternative models of instruction. A primary goal of faculty contact with a student should be to guide the student learner when guidance is most needed and in a way that inspires exploratory self-study. The new technologies can mitigate some of the constraints of time, place, and scheduling that hamper this ideal mentor/apprentice relationship. But overlaying technology on the contact-hour model of instruction is costly. We must utilize the flexibilities inherent in technology to discover models of instruction more appropriate to the emerging knowledge economy than to the receding industrial age with its assembly-line model of instruction. This can happen with the assistance of computer and video networks and technologies. But we must understand the differences between computer networks and video networks if we are to experiment usefully on the future of instruction in the context of the growing demand for accountability.

> *The public and the body politic at all levels are worried about the spiraling price of a higher education and the value it delivers.*

The primary difference between computer (data) networking and video networking is not video itself. After all, we can capture, store, and retrieve video in digital form across computer networks—"video on demand." The critical difference is that a real-time video network, as typically deployed for distance education, is time-dependent with interconnections mediated by humans. The resources for a teleclass or teleconference are scarce and must be negotiated and scheduled, and the time-dependent interconnections among the participating sites must be managed by a technician. In contrast, a student at a computer connected to a computer network can have access any time to any available resource on the network, and this access is mediated by computers without additional human intervention. Computer networks scale much more readily than do (real-time) video networks. This expensive difference between computer and video networks will persist even after today's analog video technologies are replaced by digital technologies in a few short years.

We would serve society and our own institutions well by trying to understand how to create a *distributed learning environment* combining the best features of traditional instructional models, whether campus-based or real-time video-based, with the new asynchronous opportunities for sharing and communicating enabled by our campus networks and their connections to the Internet. But the phrase "distributed learning environment" implies a shared responsibility for student learning among many different institutions. No institution has the resources to create a distributed learning environment solely for its students. Institutional resources will have to be pooled and new funding and accounting models created if today's institution-centered model of education is to shift toward a society-centered model. We must work together to provide "learning on demand" while retaining the valuable competitive distinctions among institutions that guide and certify an individual's higher education. Unless our individual institutions begin to act as partners to create a national educational fabric, higher education may not survive as an institution. Navigating the implied transition will require executive leader-

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Bill Graves is Professor of Mathematics, Associate Provost for Information Technology, and Director of the Institute for Academic Technology at the University of North Carolina at Chapel Hill. He also chairs a planning committee for the National Learning Infrastructure Initiative under the aegis of EDUCOM.

ship at the institutional and collective level.

Motivation for starting the transition lies not just in the external pressure for increased instructional productivity and accountability manifested in different stages in different institutions, but also in the educational problems common to almost all colleges and universities. There is little risk in trying to find shared technology-enabled solutions to important national educational problems, such as students' weak command of basic mathematical skills. This weakness erects barriers to post-secondary study in many other quantitative fields and depresses retention and graduation rates in our institutions. This is but one example of a national educational problem in which collective executive leadership would be welcomed by the associated disciplinary community of scholars even if the executive leadership insisted on the economic viability (productivity) of the solution. In other words, the search for technology-enabled increases in educational quality, instructional productivity, and educational access should start with educational goals perceived by all stakeholders as nationally problematic, therefore amenable to risk-taking innovation and palpable faculty enthusiasm for change.

Information technology provides new leverage for higher education's most important asset: its intellectual capital, the faculty. Faculty members know a subject deeply enough to discover new knowledge, to assemble learning materials for apprentice learners, and to connect specific subject matter to larger bodies of knowledge. They advise their institutions and professional organizations on a framework for certifying command of content and for judging the achievements of individual learners against these framing standards, and they collectively decide the nature of degree programs at their institutions. We must learn how the new technologies can enhance the social contract between learner, mentor, and institution. How can the bond between a faculty member and a student be strengthened while utilizing the disintermediating potential of information technologies to increase instructional productivity? Which students need to be *on* campus, to what extent, and when? What are the key civilizing factors in the on-campus experience? Which aspects of learning can best be mediated directly by the faculty and which can be mediated indirectly by interactive technologies? Answering these questions in a way that increases quality and access while containing instructional costs will require a deep understanding of the national academic enterprise and new relationships with education's public, non-profit, and commercial supporters.

There is little risk in trying to find shared technology-enabled solutions to important national educational problems.

The transition from an institution-centered, lecture-centered teaching infrastructure to a *national learning infrastructure* will not be easy. Technologists alone can not lead the way, as they did in creating the Internet. The focus is shifting away from the electronic medium itself and onto its mind-boggling capacity to amplify the human experience—the message. We would do well to remember that quality education and quality entertainment share one characteristic. Both should be engaging. Only education executives can identify the fiscal and human resources needed to support a national information infrastructure that serves national educational goals as well as its serves the commercial quest for compelling entertainment. Although external support can seed innovation and change, it typically is conditioned by a requirement that the institution assume any and all attendant long-term support. We therefore cannot count on external support for on-going instructional programs. It will be essential to plan and manage the future in ways that secure our investments in information technology and optimize them to the benefit of our collective educational mission. It will not suffice to view information technology as an institutional budgetary black hole to be fed periodically to the benefit of the technological *cognoscenti*. Navigating the traditionally slow-moving waters of academic change in the face of the societal wave of expectations surrounding the evolving national information infrastructure will require deft leadership empowered by knowledgeable and supportive governing bodies.

After a quarter of a century of broad experience on the faculty at the University of North Carolina at Chapel Hill, to include administrative responsibility for general education and an interim term as chief academic officer, I am convinced that these issues are the most important ones that higher education will face in my lifetime. The future of the campus is at stake as we reflect on the implications of information technology for the campus of the future. ■

Emulating Mickey Mouse Without Feeling Goofy

by Howard Strauss, Princeton University

This is Part Two of this article. Part One, describing the details of the Disney approach, appeared last month.

Dopey Users?

Locking your keys in your car or forgetting where you parked it is a silly mistake on the part of a user (er, guest). How do you handle dumb things your users do? "I just accidentally erased my doctoral dissertation and I have no backup, not even a printed copy. I was due to turn it in tonight." Do you treat such users as criminals who must pay for their crimes, as someone who is technologically disadvantaged, as a child who has just wet his bed? Do you fine them for their transgression to discourage them from doing the same dumb thing again? Or do you do what Disney does, and anticipate that users will do dumb things, put the organization and procedures in place to solve the problem quickly, empathize with the user, and try to exceed the user's expectations?

For example, once you quickly unerase the user's file you might say, "I noticed that your computer is network connected. I could put something on your computer that would back up your hard disk automatically over the network. It's free and I could install it for you right now and tell you how it works if you'd like. Then you'd never have the inconvenience of losing another important file."

How we treat dumb things that users do, how we handle their disappointments (e.g., I'm too short to go on that ride. I can't run that program on my IBM/XT.), how we exceed our user's expectations in everything we do, and how fanatically we pay attention to details will determine our success in the future much more surely than how fast we can disseminate the latest in client/server computing or the next version of the word processor.

At Disney World, the second most asked question (the first is, "Where are the bathrooms?") is, "What time is the 3 o'clock parade?" You could answer, "At 3 o'clock," and you would have met users' expectations. But Disney exhorts cast members to do better. Thus a typical Disney answer is, "The parade starts at 3 o'clock, but there is usually quite a crowd. You'll get a front row seat if you sit on that curb over there at 2:30." That answer takes about an extra ten seconds but, in addition to providing the information, it also makes a user feel special. All during the parade the user and his family will feel they owe their special front row seats to this cast member who took an extra few seconds with them. Disney people do this all the time—exceed the guests' expectations—and so can we.

> *Everyone, even the CEO, is responsible for little things, and when every little thing is done just a little better than it has to be, it adds up to a unforgettable experience.*

After hearing Dennis Snow's talk I began to look carefully at the Disney Dolphin hotel where I was staying. I hadn't even noticed before, but a beach scene was painted on the walls of the hallway leading to my room. The carpet matched the color of the sand painted on the walls so it appeared as if I were walking on the beach between colorful beach umbrellas and sand castles. There were painted clouds in the painted sky and the lights on the hallway walls were in the shape of clouds as well. I passed by a maid cleaning another room (mine had been done already by another maid) and she smiled at me and asked me if there was anything I needed. I was speechless. If Disney fussed this much about a hallway, imagine what they did about the big things. But there are no big things. Big things are made up of lots of little things. Everyone, even the CEO, is responsible for little things, and when every little thing is done just a little better than it has to be, it adds up to a unforgettable experience.

That's just what we must to do for our guests and other cast members. Here's how to get started:

Don't Duck These Responsibilities

Treat everyone—users, colleagues, vendors, friends, relatives—as guests. This is an attitude that you cannot turn off and on. You must live and breathe and believe in it all the time and apply it to everyone. Be nice to people, smile at them, and empathize with their mistakes, silliness, and irrationalities. This must become your corporate culture.

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Develop an intolerance for garbage and peeling paint. Whenever and wherever you see garbage, pick it up and throw it out. Whenever and wherever you see peeling paint, report it to someone and remember to report it again if it doesn't go away. Learn to look carefully for garbage and peeling paint so that you don't miss any. Make sure that people know it is ok to report peeling paint.

Pay attention to details in everything you do. Don't assume that any detail is too small for your guests to notice. If you know about it, you should assume it is important to your guests.

Exceed the expectations of your guests and fellow cast members in everything you do. Every time you do something, try to do a little more than is expected. This applies equally to being asked a question in the hall and to developing the next campus information system. Like treating everyone as a guest, this is an attitude that must become part of the way you live, not something you just put on only while you are at work.

Get your colleagues to do these things too. If you can't dragoon them off to a long orientation on Mickey Mouse Management and corporate culture, then schedule short meetings about it, write memos about it, bring it up in other meetings, and talk endlessly about it. "Is this the way Disney would do this?" is one way to nudge people whenever you see some egregious example of poor service.

While you are working on getting people to adopt these principles, live them yourself. Accept the fact that you'll never get everyone to do this, but that having anyone do it is a great advantage to your organization. If you want to see this in action, go to Disney World.

Doing these things will provide your users, colleagues, and others with a high level of service. It will make all the people who do this and all who come in contact with them happier and more enthusiastic about what they are doing. Your organization will become a much nicer place to work and a great place to visit. Your guests will just accept the fact that you have wonderful, reliable systems, but they will be amazed at the friendly, happy people whose systems and service always exceed their expectations. And there is nothing goofy about making that happen. ■

"...Jim never leaves his room. He is an Internet addict. This affliction isn't all bad. Whenever I am lonely I can count on his being around. He's gaining valuable experience for his major, computer science. And he now has friends around the world. The trouble is, he hasn't made any friends here.... The responsibility for maintaining human contact in the electronic age rests largely in the behavior of computer users. The key is to get off the Internet every now and then and experience those tangible things that the computer can offer only vicariously."

Jen Proctor
Student, University of Texas at Austin
Column
The Daily Texan
January 25, 1995

In Future Issues

- *The good client and the good consultant*
- *The impact of telecommunications on higher education*
- *IT's role in the National Quality Awards for higher education*

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EDUTECH RESPONDS

Q. My department, Computer Services, developed a ten-year plan for computing and related technologies back in 1990 that was immediately approved by the president. We tracked along pretty well for a couple of years, but then things slowly started to fall apart. For instance, in early 1993, the president's cabinet decided that a project we hadn't even known about in 1990 was to suddenly take precedence over everything else. This set us back in our original plan by almost a year. Then the users whose needs were to be addressed in the second half of the plan (1995-2000) started complaining that their solutions were too far away, and they began doing things on their own. We also did not anticipate fully how long some of the actual work would take, and that set us back a bit. The ten-year plan now looks like a twenty-year plan, and we are feeling very discouraged. Any advice?

A. *Do a new plan right now and scrap the old one as quickly as possible. Most important, however, is not so much the plan itself as the planning process. To distinguish it from the old plan, we recommend that the new plan be put together by the community, not by Computer Services; that it be considered a guideline rather than an inflexible dictum; that it cover three years instead of ten; and that it be reviewed yearly.*

Q. Just like everyone else, we're heavily into desktop computing these days. In general, this is good for the users, but we have a big problem in the area of support. All of this comes as an add-on to everything else we've been doing over the years, but asking for new positions is impossible. Are there guidelines on the proper ratio of machines to support staff?

A. *There are no guidelines that we know of, in the sense of models to follow; there are, however, some sketchy data on what people are actually doing at this point. The business world seems to be ahead of higher education in this regard: with a ratio somewhere between 50 and 100 machines per support staff in business, and between 100 and 150 machines per support staff in colleges and universities. By "support," we mean everything from pre-purchase advice to installation, training, upgrading, and troubleshooting.*

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